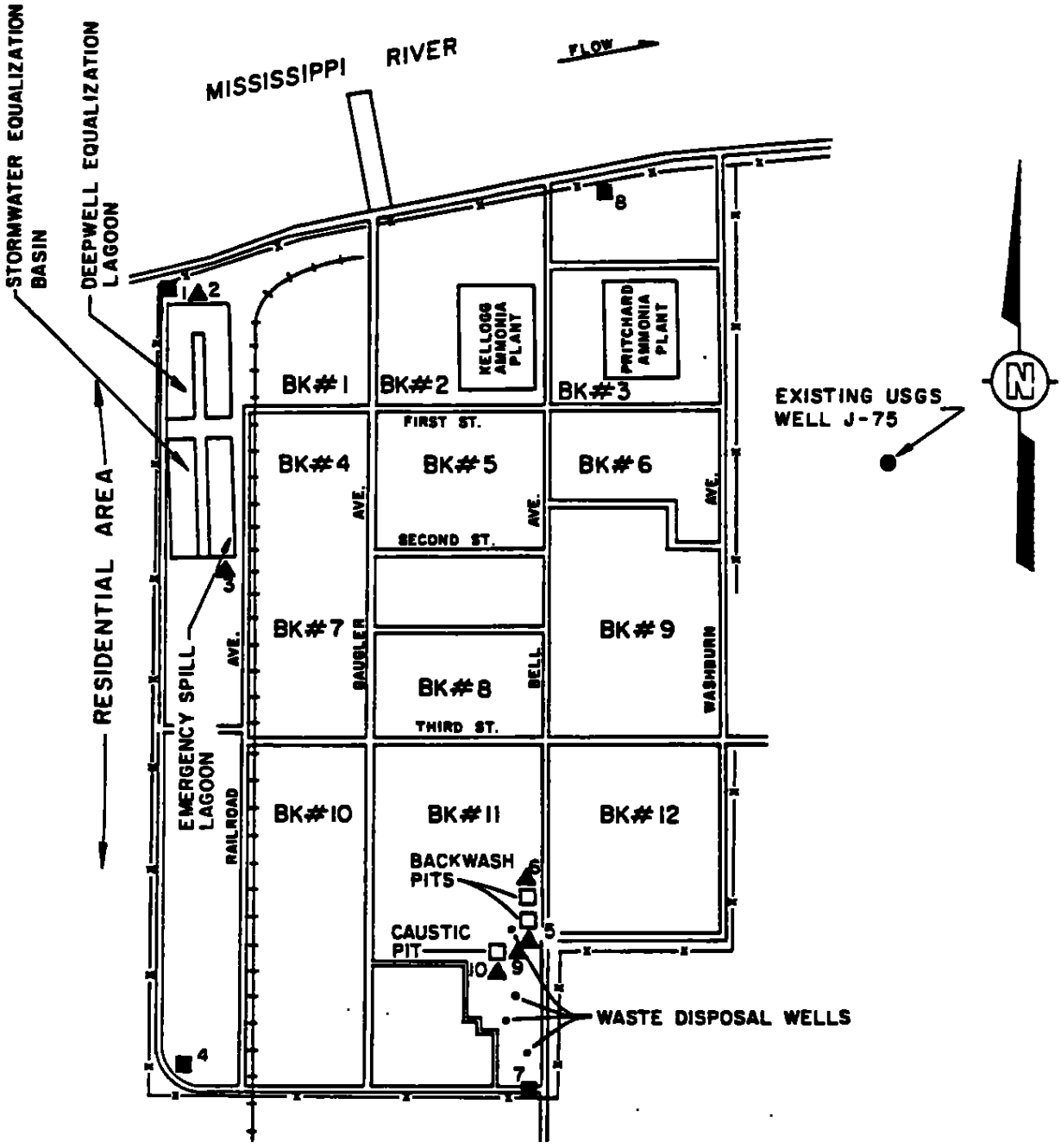
SECTION

2

DRAWN BY	M.DORAN	CHECKED BY	RCB	9-22-81	DRAWING NUMBER SWBI-491-AI
	6-6-81	APPROVED BY	DLC	1-22-81	



LEGEND

- ■ MONITOR WELL COMPLETED IN POINT BAR DEPOSITS TO ESTABLISH GROUNDWATER QUALITY (4)
- ▲ MONITOR WELL COMPLETED IN SHALLOW SAND DEPOSITS AS EARLY INDICATORS OF GROUNDWATER CONTAMINATION (5)

500 0 500 FEET
SCALE

2 REVISION, 9-22-81

FIGURE 1

GROUNDWATER MONITORING SYSTEM
FORTIER PLANT

PREPARED FOR

AMERICAN CYANAMID COMPANY
WESTWEGO, LOUISIANA

D'APPOLONIA

IDAHO WELL COMPLETION RECORD

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME American Cyanamid PROJECT NUMBER SW81-491

FIELD ENG./GEO. YJL APPROX. ELEV. 13.94 feet MSL

COORDINATES N 9.08 E 66.64 DRILLING METHODS Rotary

PAGE 1 OF 2
BORING NO #1
DATE 9-2-81

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH

DI	CASING BLOWS PER 30 CM.	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U.S.C.S. SYMBOL	DESCRIPTION	REMARKS
5							Brown Silty Clay	
10							18.0'	
20							Gray Silt, Trace of Clay	
25							38.0'	
40							Gray Silt	
							45.0'	

NOTES:

IDAHO

D'APPOLONIA WELL COMPLETION RECORD

2-2-120

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME Ameri-car Cranamid PROJECT NUMBER SW81-491

FIELD ENG./GEO. YJL APPROX. ELEV. _____

COORDINATES _____ DRILLING METHODS Rotary

PAGE 2 OF 2
BORING NO. #1
DATE 9-2-81

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH

DEPTH	CASING BLOWS PER 30 CM.	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U.S.C.S. SYMBOL	DESCRIPTION	REMARKS
0								
55							Gray Silt, Trace of Clay	
60								
65							68.0'	
70							Gray Clayey Sand	
75								Tip of Monitor Well at 78.6'
80							Bottom of Drilling at 80.0'	

NOTES:

D'APPOLONIA

PIEZOMETER SENSITIVITY TEST

PROJECT NAME AMERICAN CYANAMID TESTED BY YJL DATE 2/11/91

PROJECT NO. SWGI-421

BORING NO. MONITOR WELL No 1

PIEZOMETER NO. _____

TEST TRIAL NO. 1

GWL BELOW TOP OF PIPE PRIOR TO TEST 49'

TIME READING TAKEN 1725 HRS

THE PIEZOMETER WAS FILLED WITH WATER. THE FOLLOWING DATA SHOW THE DROP OF WATER FROM THE TOP OF THE PIPE AS TIME ELAPSED.

ELAPSED TIME (MINUTES)	DROP OF WATER (FEET)
1	0.08
2	0.16

BASED ON THE ABOVE DATA, IT IS CONCLUDED THAT THE PIEZOMETER IS:

X FUNCTIONING PROPERLY

_____ NOT FUNCTIONING PROPERLY

IDAIPODIADNIA

PIEZOMETER SENSITIVITY TEST

PROJECT NAME AMERICAN CYANAMID TESTED BY RCB/JLF DATE 1/20/82
PROJECT NO. 5091-491

BORING NO. MONITOR WELL NO. 1
PIEZOMETER NO. 1
TEST TRIAL NO. 2.
SWL BELOW TOP OF PIPE PRIOR TO TEST 7.31'
TIME READING TAKEN 1130 HRS

THE PIEZOMETER WAS FILLED WITH WATER. THE FOLLOWING DATA SHOW THE DROP OF WATER FROM THE TOP OF THE PIPE AS TIME ELAPSED.

ELAPSED TIME (MINUTES)	DROP OF WATER (FEET)
0.25	0.10
0.50	0.16
0.75	0.25
1.00	0.30
1.25	0.35
1.50	0.03
1.75	0.50
2.00	0.55
[illegible]	[illegible]
[illegible]	[illegible]
2.75	0.70
3.00	0.77
3.25	0.83
3.50	0.89
3.75	0.93
4.00	0.97

BASED ON THE ABOVE DATA, IT IS CONCLUDED THAT THE PIEZOMETER IS:

X FUNCTIONING PROPERLY
____ NOT FUNCTIONING PROPERLY

IDAHO WELL COMPLETION RECORD

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME American Cyanamid PROJECT NUMBER SW81-491
FIELD ENG./GEO. YJL APPROX. ELEV. 14.27 feet MSL
COORDINATES S 41.92 E 105.64 DRILLING METHODS Rotary

PAGE 1 OF 1
BORING NO #2
DATE 9-3-81

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH

DEPTH	CASING BLOWS PER 30 CM.	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U.S.C.S. SYMBOL	DESCRIPTION	REMARKS
5							Brown Clay	
10							13.0'	
20							Gray Silty Clay	
25								Tip of Monitor Well at 28.7'
30							Bottom of Drilling at 30.0'	

NOTES:

IDAHO

PIEZOMETER SENSITIVITY TEST

PROJECT NAME AMERICAN CYANAMID TESTED BY YJL DATE 9/11/81
PROJECT NO. SW81-491

BORING NO MONITOR WELL NO. 2
PIEZOMETER NO. ____
TEST TRIAL NO. 1
GWL BELOW TOP OF PIPE PRIOR TO TEST 6'-1"
TIME READING TAKEN 1714 HRS

THE PIEZOMETER WAS FILLED WITH WATER. THE FOLLOWING DATA SHOW THE DROP OF WATER FROM THE TOP OF THE PIPE AS TIME ELAPSED.

ELAPSED TIME (MINUTES)	DROP OF WATER (FEET)
0.25	0.21
0.50	0.27

BASED ON THE ABOVE DATA, IT IS CONCLUDED THAT THE PIEZOMETER IS:

\ FUNCTIONING PROPERLY
_____ NOT FUNCTIONING PROPERLY

IDAHO LAB

PHILADELPHIA WELL COMPLETION RECORD

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME American Cyanamid PROJECT NUMBER SW81-491
FIELD ENG./GEO. YJL APPROX. ELEV. 12.28 feet MSL
COORDINATES S 1323.92 E 212.64 DRILLING METHODS Rotary

PAGE 1 OF 1
BORING NO. #3
DATE 9-9-81

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH

DEPTH	CASING BLOWS PER 30 CM.	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U.S.C.S. SYMBOL	DESCRIPTION	REMARKS
5							Brown Clay	
10								
15							18.0'	
20							Brown to Gray Silty Clay	
25								Tip of Monitor Well at 28.3'
30							Bottom of Drilling at 30.0'	

NOTES:

PIEZOMETER SENSITIVITY TEST

PROJECT NAME AMERICAN CYANAMID TESTED BY YTL DATE 7/11/81
PROJECT NO. 81-491

BORING NO. MONITOR WELL NO. 3
PIEZOMETER NO. ____
TEST TRIAL NO. 1
GWL BELOW TOP OF PIPE PRIOR TO TEST 5'-8"
TIME READING TAKEN 1412 HRS

THE PIEZOMETER WAS FILLED WITH WATER. THE FOLLOWING DATA SHOW THE DROP OF WATER FROM THE TOP OF THE PIPE AS TIME ELAPSED.

ELAPSED TIME (MINUTES)	DROP OF WATER (FEET)
0.17	0.42
0.34	0.71

BASED ON THE ABOVE DATA, IT IS CONCLUDED THAT THE PIEZOMETER IS:

X FUNCTIONING PROPERLY
____ NOT FUNCTIONING PROPERLY

IDAHO

D'APPOLONIA WELL COMPLETION RECORD

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME American Cyanamid PROJECT NUMBER SW81-491

FIELD ENG./GEO. YJL APPROX. ELEV. 6.52 feet MSL

COORDINATES S 3619.19 E 167.07 DRILLING METHODS Rotary

PAGE 1 OF 2
BORING NO. #2
DATE 9-8-81

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH

TH	CASING BLOWS PER 30 CM.	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U.S.C.S. SYMBOL	DESCRIPTION	REMARKS
5								
10							Brown Clay	
							20.0'	
20								
5								
30							Gray Silty Clay	
40								

NOTES:

D'APPOLONIA

IDAHO WELL COMPLETION RECORD

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME Cyanamid PROJECT NUMBER SW81-491
FIELD ENG./GEO. YJL APPROX. ELEV. _____
COORDINATES _____ DRILLING METHODS Rotary

PAGE 2 OF 2
BORING NO #4
DATE 9-8-81

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH

DEPTH	CASING BLOWS PER 30 CM.	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U.S.C.S. SYMBOL	DESCRIPTION	REMARKS
50							Gray Silty Clay 53.0'	
55							Gray Sandy Silt	Tip of Monitor Well at 62'
60								
65							Bottom of Drilling at 65.0'	

NOTES:

IDAHO

PIEZOMETER SENSITIVITY TEST

PROJECT NAME AMERICAN CYANAMID TESTED BY YJL DATE 9/1/81
PROJECT NO. SWSI-491

BORING NO. MONITOR WELL No. 4
PIEZOMETER NO. ____
TEST TRIAL NO. 1
GWL BELOW TOP OF PIPE PRIOR TO TEST 8'-7"
TIME READING TAKEN 1709 HRS

THE PIEZOMETER WAS FILLED WITH WATER. THE FOLLOWING DATA SHOW THE DROP OF WATER FROM THE TOP OF THE PIPE AS TIME ELAPSED.

ELAPSED TIME (MINUTES)	DROP OF WATER (FEET)
0.5	0.21
1.0	0.38

BASED ON THE ABOVE DATA, IT IS CONCLUDED THAT THE PIEZOMETER IS:

X FUNCTIONING PROPERLY
____ NOT FUNCTIONING PROPERLY

IDAHPOLONIA

PIEZOMETER SENSITIVITY TEST

PROJECT NAME AMERICAN CYANAMID TESTED BY JLF DATE 1/20/82
PROJECT NO. SW 81-491

BORING NO. MONITOR WELL NO. 4
PIEZOMETER NO. 4
TEST TRIAL NO. 2
SWL BELOW TOP OF PIPE PRIOR TO TEST 4.96'
TIME READING TAKEN 1425 HRS

THE PIEZOMETER WAS FILLED WITH WATER. THE FOLLOWING DATA SHOW THE DROP OF WATER FROM THE TOP OF THE PIPE AS TIME ELAPSED.

ELAPSED TIME (MINUTES)	DROP OF WATER (FEET)
0.25	0.19
0.50	0.38
0.75	0 55
1.00	0.71
1.25	0.86
1 50	1.00

BASED ON THE ABOVE DATA, IT IS CONCLUDED THAT THE PIEZOMETER IS:

__X__ FUNCTIONING PROPERLY
_____ NOT FUNCTIONING PROPERLY

IDAHO DIVISION OF ENVIRONMENT — WELL COMPLETION RECORD — 2-120

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME American Cyanamid — PROJECT NUMBER SW81-491
FIELD ENG./GEO. YJL — APPROX. ELEV. 10.10 feet MSL
COORDINATES S 2842.19 E 1645 — DRILLING METHODS Rotary

PAGE 1 OF 2
BORING NO #5
DATE 8-31-81

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH

DEPTH	CASING BLOWS PER 30 CM.	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U.S.C.S. SYMBOL	DESCRIPTION	REMARKS
5							Brown Clay, Trace of Organics 8.0	
10							Brown to Tan Silty Clay 23.0	
25							Tan Silt, Trace of Sand 45.0	Tip of Monitor Well at 28'
40								
45								

NOTES:

IDAHO DIVISION OF ENVIRONMENT

IDAHO WELL COMPLETION RECORD

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME American Cyanamid PROJECT NUMBER SW81-491

FIELD ENG./GEO. YJL APPROX. ELEV. _____

COORDINATES _____ DRILLING METHODS Rotary

PAGE 2 OF 2
BORING NO #5
DATE 8-31-81

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH

DEPTH	CASING BLOWS PER 30 CM.	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U.S.C.S. SYMBOL	DESCRIPTION	REMARKS
50							Gray Silty Clay	
55								
60							Bottom of Drilling at 60.0'	

NOTES

IDAHO

PIEZOMETER SENSITIVITY TEST

PROJECT NAME AMERICAN CYANAMID TESTED BY YGL DATE 9/11/81
PROJECT NO. 3191-491

BORING NO. MONITOR WELL NO 5
PIEZOMETER NO. ____
TEST TRIAL NO. 1
GWL BELOW TOP OF PIPE PRIOR TO TEST 9'
TIME READING TAKEN 1620 HRS

THE PIEZOMETER WAS FILLED WITH WATER. THE FOLLOWING DATA SHOW THE DROP OF WATER FROM THE TOP OF THE PIPE AS TIME ELAPSED.

ELAPSED TIME (MINUTES)	DROP OF WATER (FEET)
0.5	0.33
1.0	0.52

BASED ON THE ABOVE DATA, IT IS CONCLUDED THAT THE PIEZOMETER IS:

__X__ FUNCTIONING PROPERLY
_____ NOT FUNCTIONING PROPERLY

D'APPOLONIA

PIEZOMETER SENSITIVITY TEST

PROJECT NAME AMERICAN CYANAMID TESTED BY JCF DATE 1/20/82
PROJECT NO. SW81-491

BORING NO. MONITOR WELL NO. 5
PIEZOMETER NO. 5
TEST TRIAL NO. 2
GWL BELOW TOP OF PIPE PRIOR TO TEST 4.62'
TIME READING TAKEN 1455 HRS

THE PIEZOMETER WAS FILLED WITH WATER. THE FOLLOWING DATA SHOW THE DROP OF WATER FROM THE TOP OF THE PIPE AS TIME ELAPSED.

ELAPSED TIME (MINUTES)	DROP OF WATER (FEET)
0.25	0.21
0.50	0.38
0.75	0.52
1.00	0.76
1.25	0.77
1.50	0.88
1.75	0.97
2.00	1.10

BASED ON THE ABOVE DATA, IT IS CONCLUDED THAT THE PIEZOMETER IS:

__X__ FUNCTIONING PROPERLY
_____ NOT FUNCTIONING PROPERLY

IDAHPDILADNLA WELL COMPLETION RECORD 2 2 120

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME American Cyanamid PROJECT NUMBER SW81-491

FIELD ENG./GEO. YJL APPROX. ELEV. 8.98 feet MSL

COORDINATES S 2634.19 E 1658 DRILLING METHODS Rotary

PAGE 1 OF 1
BORING NO #6
DATE 9-9-81

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH

DEPTH	CASING BLOWS PER 30 CM.	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U.S.C.S. SYMBOL	DESCRIPTION	REMARKS
5							Tan Silt Clay	
10							13.0'	
							Tan Clay	
							18.0'	
20								
25							Tan Silty Clay	
30								Tip of Monitor Well at 28'
							Bottom of Drilling at 30.0'	

NOTES:

IDAHPDILADNLA

PIEZOMETER SENSITIVITY TEST

PROJECT NAME AMERICAN CYANAMID TESTED BY YJL DATE 9/11/81
PROJECT NO. SWA1-491

BORING NO. MONITOR WELL NO 6
PIEZOMETER NO. ____
TEST TRIAL NO. 1
GWL BELOW TOP OF PIPE PRIOR TO TEST 5'-0"
TIME READING TAKEN 1644 HRS

THE PIEZOMETER WAS FILLED WITH WATER. THE FOLLOWING DATA SHOW THE DROP OF WATER FROM THE TOP OF THE PIPE AS TIME ELAPSED.

ELAPSED TIME (MINUTES)	DROP OF WATER (FEET)
0.5	0.33
1.0	0.58

BASED ON THE ABOVE DATA, IT IS CONCLUDED THAT THE PIEZOMETER IS:

X FUNCTIONING PROPERLY
____ NOT FUNCTIONING PROPERLY

IDAHO

IDAHO DIVISION — WELL COMPLETION RECORD — 2 2 -120

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME American Cyanamid — PROJECT NUMBER SW81-491

FIELD ENG./GEO. YJL — APPROX. ELEV. 6.83 feet MSL

COORDINATES S 3559.17 E 1721.07 — DRILLING METHODS Rotary

PAGE 1 OF 2
BORING NO #7
DATE 9-1-81

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH

DEPTH	CASING BLOWS PER 30 CM.	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U.S.C.S. SYMBOL	DESCRIPTION	REMARKS
5							Brown Clay	
10								
15								
20							20.0'	
25							Gray Silty Clay	
30								
35								
40							39.0'	
45							Dark Gray Fine Sand	

NOTES:

IDAHO DIVISION

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME American Cyanamid PROJECT NUMBER SW81-491
FIELD ENG./GEO. YJL APPROX. ELEV. _____
COORDINATES _____ DRILLING METHODS Rotary

PAGE 2 OF 2
BORING NO #7
DATE 9-1-81

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH

DEPTH	CASING BLOWS PER 30 CM.	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U.S.C.S. SYMBOL	DESCRIPTION	REMARKS
							Dark Gray Fine Sand	Tip of Monitor Well at 45.7'
							Bottom of Drilling at 50.0'	

ES:

PIEZOMETER SENSITIVITY TEST

PROJECT NAME AMERICAN CYANAMID TESTED BY YJL DATE 9/11/81
PROJECT NO. SWG1-491

BORING NO. MONITOR WELL NO 7
PIEZOMETER NO. ____
TEST TRIAL NO. 1
GWL BELOW TOP OF PIPE PRIOR TO TEST 5'-6"
TIME READING TAKEN 1657 HRS

THE PIEZOMETER WAS FILLED WITH WATER. THE FOLLOWING DATA SHOW THE DROP OF WATER FROM THE TOP OF THE PIPE AS TIME ELAPSED.

ELAPSED TIME (MINUTES)	DROP OF WATER (FEET)
PERMEABILITY AT TIP WAS	SO HIGH THAT THE MONITORING
WELL COULD NOT BE FILLED	WITH WATER

BASED ON THE ABOVE DATA, IT IS CONCLUDED THAT THE PIEZOMETER IS:

X FUNCTIONING PROPERLY
____ NOT FUNCTIONING PROPERLY

IDAHO

PIEZOMETER SENSITIVITY TEST

PROJECT NAME AMERICAN CYANAMID TESTED BY JLF DATE 1/20/92
PROJECT NO. SW81-491

BORING NO. MONITOR WELL NO. 7
PIEZOMETER NO. 7
TEST TRIAL NO. 2
GWL BELOW TOP OF PIPE PRIOR TO TEST 3.09'
TIME READING TAKEN 1440 HRS

THE PIEZOMETER WAS FILLED WITH WATER. THE FOLLOWING DATA SHOW THE DROP OF WATER FROM THE TOP OF THE PIPE AS TIME ELAPSED.

ELAPSED TIME (MINUTES)	DROP OF WATER (FEET)
0.25	1.62
0.50	-
0.75	2.63
1.00	2.96

BASED ON THE ABOVE DATA, IT IS CONCLUDED THAT THE PIEZOMETER IS:

X FUNCTIONING PROPERLY
____ NOT FUNCTIONING PROPERLY

IDAHO

D'APPOLONIA WELL COMPLETION RECORD

2 2 120

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME American Cyanamid PROJECT NUMBER SW81-491

FIELD ENG./GEO. YJL APPROX. ELEV. 13.54 Feet MSL

COORDINATES N 443.75 E 1940.95 DRILLING METHODS Rotary

PAGE 1 OF 2
BORING NO #8
DATE 9-3-81

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH

DEPTH	CASING BLOWS PER 30 CM.	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U.S.C.S. SYMBOL	DESCRIPTION	REMARKS
5							Brown Silty Clay	
10							12.0'	
15							Brown to Gray Clay	
20								
25							28.0'	
30							Gray Fine Sand	Tip of Monitor Well at 38'
35								
40								

NOTES:

D'APPOLONIA

IDAHO DIVISION WELL COMPLETION RECORD

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME American Cyanamid PROJECT NUMBER SW81-491

FIELD ENG./GEO. YJL APPROX. ELEV. _____

COORDINATES _____ DRILLING METHODS Rotary

PAGE 2 OF 2
BORING NO #8
DATE 9-3-81

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH

DEPTH	CASING BLOWS PER 30 CM.	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U.S.C.S. SYMBOL	DESCRIPTION	REMARKS
55							Gray Fine Sand	
							Bottom of Drilling at 60'	

N. S

IDAHO DIVISION

PIEZOMETER SENSITIVITY TEST

PROJECT NAME AMERICAN CYANAMID TESTED BY YJL DATE 9/11/81
PROJECT NO. SWQI-091

BORING NO MONITOR WELL NO 6
PIEZOMETER NO. ____
TEST TRIAL NO. 1
GWL BELOW TOP OF PIPE PRIOR TO TEST 10'-7"
TIME READING TAKEN 1729 HRS

THE PIEZOMETER WAS FILLED WITH WATER. THE FOLLOWING DATA SHOW THE DROP OF WATER FROM THE TOP OF THE PIPE AS TIME ELAPSED.

ELAPSED TIME (MINUTES)	DROP OF WATER (FEET)
PERMEABILITY AT THE TIP	WAS SO HIGH THAT THE
MONITORING WELL COULD NOT	BE FILLED WITH WATER

BASED ON THE ABOVE DATA, IT IS CONCLUDED THAT THE PIEZOMETER IS:

__X__ FUNCTIONING PROPERLY
_____ NOT FUNCTIONING PROPERLY

IDAHO

PIEZOMETER SENSITIVITY TEST

PROJECT NAME AMERICAN CYANAMID TESTED BY ZCR/TLF DATE 1/20/82
PROJECT NO. SWOI-491

BORING NO. MONITOR WELL NO. 8
PIEZOMETER NO. 8
TEST TRIAL NO. 2
GWL BELOW TOP OF PIPE PRIOR TO TEST 7.73'
TIME READING TAKEN 1200 HRS

THE PIEZOMETER WAS FILLED WITH WATER. THE FOLLOWING DATA SHOW THE DROP OF WATER FROM THE TOP OF THE PIPE AS TIME ELAPSED.

ELAPSED TIME (MINUTES)	DROP OF WATER (FEET)
PERMEABILITY AT THE TIP	WAS SO HIGH THAT THE
MONITOR WELL COULD NOT	BE FILLED WITH WATER

BASED ON THE ABOVE DATA, IT IS CONCLUDED THAT THE PIEZOMETER IS:

__X__ FUNCTIONING PROPERLY
_____ NOT FUNCTIONING PROPERLY

IDAHO WELL COMPLETION RECORD

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME American Cyanamid PROJECT NUMBER SW81-491
FIELD ENG./GEO. YJL APPROX. ELEV. 8.84 feet MSL
COORDINATES S 2900.19 E 1473 DRILLING METHODS Rotary

PAGE 1 OF 1
BORING NO #C
DATE 9-9-81

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH

DEPTH	CASING BLOWS PER 30 CM.	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U.S.C.S. SYMBOL	DESCRIPTION	REMARKS
5							Brown Clay 8.0'	
10 15							Brown Silty Clay 18.0'	
20 25							Gray Silt, Trace of Clay	Tip of Monitor Well at 28.1'
30							Bottom of Drilling at 30.0'	

NOTES:

IDAHO

PIEZOMETER SENSITIVITY TEST

PROJECT NAME AMERICAN CYANAMID TESTED BY YJL DATE 9/11/91
PROJECT NO. SWS1 - 491

BORING NO. MONITOR WELL NO 9
PIEZOMETER NO. _____
TEST TRIAL NO. 1
GWL BELOW TOP OF PIPE PRIOR TO TEST 4'
TIME READING TAKEN 1650

THE PIEZOMETER WAS FILLED WITH WATER. THE FOLLOWING DATA SHOW THE DROP OF WATER FROM THE TOP OF THE PIPE AS TIME ELAPSED.

ELAPSED TIME (MINUTES)	DROP OF WATER (FEET)
0.5	0.13
1.0	0.22

BASED ON THE ABOVE DATA, IT IS CONCLUDED THAT THE PIEZOMETER IS:

X FUNCTIONING PROPERLY
_____ NOT FUNCTIONING PROPERLY

IDAHO DIVISION

IDAHO WELL COMPLETION RECORD

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME American Cyanamid PROJECT NUMBER SW81-491
FIELD ENG./GEO. YJL APPROX. ELEV. 8.86 feet MSL
COORDINATES S 2981.19 E 1422 DRILLING METHODS Rotary

PAGE 1 OF 1
BORING NO #10
DATE 9-9-81

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH

DEPTH	CASING BLOWS PER 30 CM.	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U.S.C.S. SYMBOL	DESCRIPTION	REMARKS
10							Brown Clay 12.0'	
20							Gray Silty Clay 22.0'	
25							Gray Silty Clay, Trace of Sand	Tip of Monitor Well at 28.3'
30							Bottom of Drilling at 30.0'	

NOTES:

IDAHO

PIEZOMETER SENSITIVITY TEST

PROJECT NAME AMERICAN CYANAMID TESTED BY YJL DATE 9/11/81
PROJECT NO SW81-491

BORING NO. MONITOR WELL NO. 10
PIEZOMETER NO. 10
TEST TRIAL NO. 1
GWL BELOW TOP OF PIPE PRIOR TO TEST 7'-10"
TIME READING TAKEN 16:53 HRS

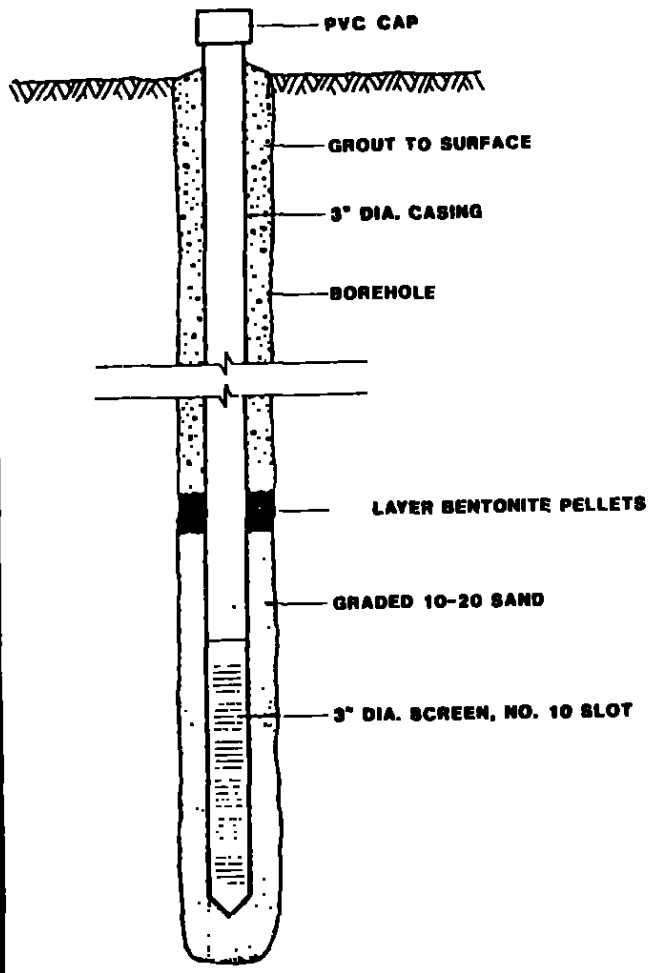
THE PIEZOMETER WAS FILLED WITH WATER. THE FOLLOWING DATA SHOW THE DROP OF WATER FROM THE TOP OF THE PIPE AS TIME ELAPSED.

ELAPSED TIME (MINUTES)	DROP OF WATER (FEET)
0.5	0.08
1.0	0.16

BASED ON THE ABOVE DATA, IT IS CONCLUDED THAT THE PIEZOMETER IS:

X FUNCTIONING PROPERLY
_____ NOT FUNCTIONING PROPERLY

D'APPOLONIA



	MW-13	MW-14	MW-15	MW-16
PLANT COORDINATES	LAT 29° 57' 30" LON 90° 16' 0"	LAT 29° 57' 30" LON 90° 16' 0"	LAT 29° 57' 30" LON 90° 16' 0"	LAT 29° 57' 30" LON 90° 16' 0"
GROUND ELEVATION (MSL)	13.40	12.11	8.15	7.55
DEPTH: SCREEN SETTING	10'-30"	10'-30"	20'-30"	20'-30"
DEPTH: TOP OF BENTONITE SEAL	8'	8'	8.25'	13'
DEPTH: TOP OF SAND PACK	9'	9'	9.75'	15'
BOREHOLE DIAMETER	8"	8"	8"	8"
TOTAL DEPTH	30'	30'	30'	32'
ELEVATION: TOP OF CASING (MSL)	15.40	13.61	9.95	9.55
MATERIAL OF CONSTRUCTION	PVC SCH. 40	PVC SCH. 40	PVC SCH. 40	PVC SCH. 40

KEN E. DAVIS

FIGURE 1

AMERICAN CYANAMID

JEFFERSON PARISH, LOUISIANA

MONITOR WELL DETAILS

10/28/83 DAL

ADRV 83-0297

BORING LOG

SHEET 1 OF 1

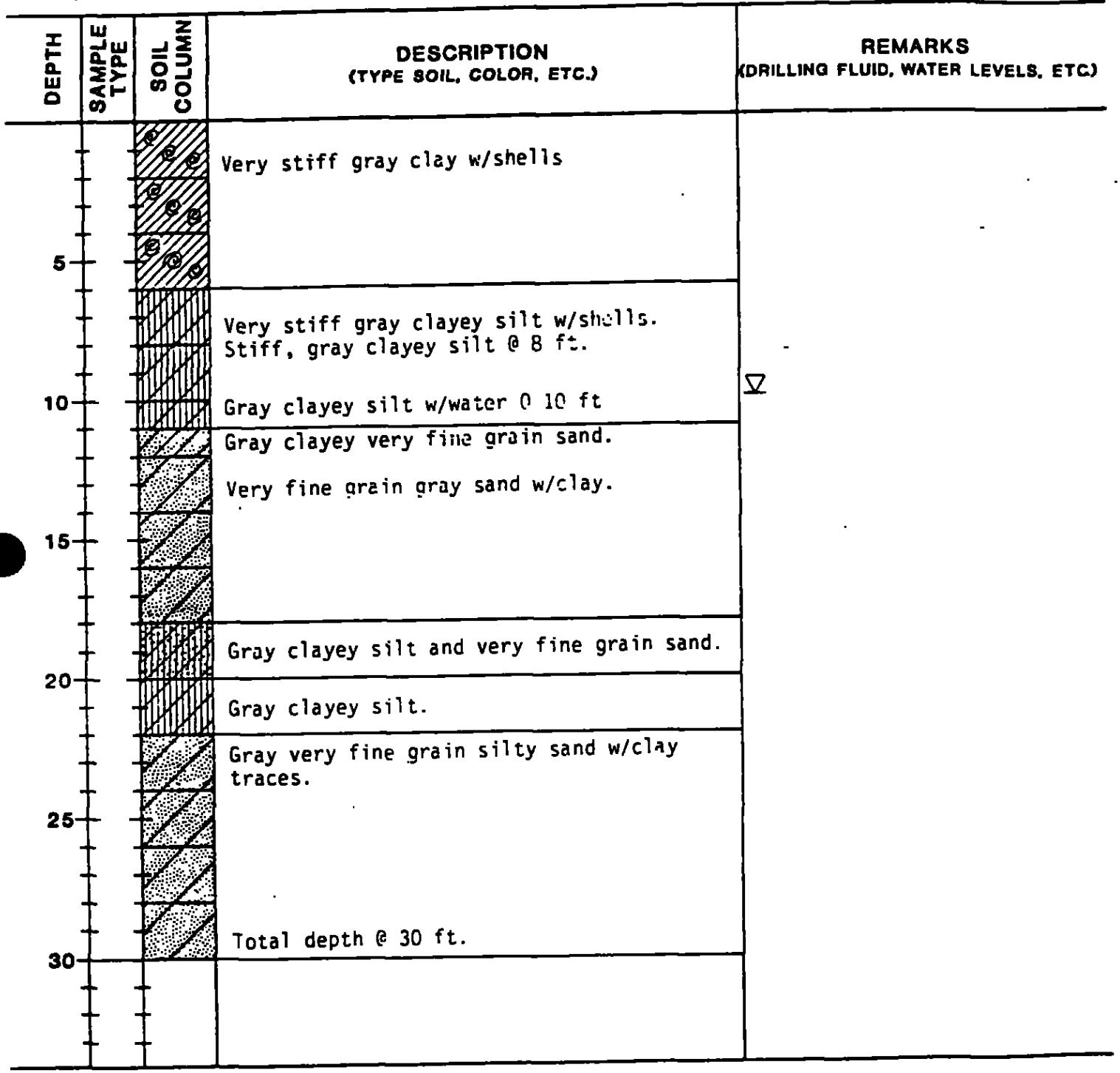
SITE American Cyanamid PROJECT NO. 83-297 HOLE NO. MW-13 GROUND EL. _____

STATE Louisiana COUNTY Jefferson LOCATION Acid Plant T.D. 30 ft

DEPTH/EL. OF WATER & DATE MEASURED: -10 ft. / date; _____ ft. / date

LOGGED BY W. Landry START 8:30 A

WEATHER Cloudy FINISH 2:30 P



EXPLANATIONS

A-AUGER CUTTING
SS-SPLIT SPOON
ST-SHELBY TUBE
WS-WATER SAMPLE

oo CALCAREOUS NODULES
XX BROKEN-CRUMBLY
··· FE (IRON) GRANULES
— HEAVY OXIDATION LAYER
@ SHELLS

LEGEND

CLAY
GRAVEL
SAND
SILT

KED KEN E. DAVIS ASSOCIATES

BORING LOG

SHEET 1 OF 1

SITE American Cyanamid PROJECT NO. 83-297 HOLE NO. MW-14 GROUND EL. _____

STATE Louisiana COUNTY Jefferson LOCATION Acid Plant-South T.D. 30 ft

DEPTH/EL. OF WATER & DATE MEASURED: -9 ft. date / _____ ft. date

LOGGED BY W. Landry START 11:30 A

WEATHER Cloudy FINISH 3:20 P

DEPTH	SAMPLE TYPE	SOIL COLUMN	DESCRIPTION (TYPE SOIL, COLOR, ETC.)	REMARKS (DRILLING FLUID, WATER LEVELS, ETC)
			Very stiff gray clay w/shells and iron oxide granules.	
5			Very stiff gray clayey silt.	
			Very fine sand in seam @ 8 feet	
			Brown silt w/very fine grain sand seams & clay traces	▽
10			Very fine grain brown & gray silty sand w/ shells @ 11 ft.	
			Fine grain sand.	
15			Fine grain gray sand w/silty clay @ 16 ft.	
			Very fine grain gray clayey sand w/silt seam @ 17 ft	
			Very fine grain sand w/small roots	
20			Silt seam w/shells @ 21 ft.	
			Very fine grain gray silty sand @ 22 ft	
			Fine grain gray sand.	
			Fine grain gray clayey sand 24 - 25 ft	
25			Gray silty clay 25 - 26 ft	
			Gray clayey silt 26 - 27 ft	
			Gray fine sand w/clay traces	
			Gray clayey silt w/sand seams TD @ 30 ft.	
30				

EXPLANATIONS

A-AUGER CUTTING
SS-SPLIT SPOON
ST-SHELBY TUBE
WS-WATER SAMPLE

oo CALCAREOUS NODULES
XX BROKEN-CRUMBLY
··· FE (IRON) GRANULES
— HEAVY OXIDATION LAYER
@ SHELLS

LEGEND

CLAY
GRAVEL
SAND
SILT

KEN E. DAVIS ASSOCIATES

BORING LOG

SHEET 1 OF 1

SITE American Cyanamid PROJECT NO. 83-297 HOLE NO. MW-15 GROUND EL. _____

STATE Louisiana COUNTY Jefferson LOCATION Adj. substation T.D. 30 feet

DEPTH/EL. OF WATER & DATE MEASURED 8 ft. 7/20/83 date } _____ ft. _____ date

LOGGED BY John Webb WEATHER Hot, humid

START 1:40 P 7/20/83 FINISH 6:00 P 7/20/83

DEPTH	SAMPLE TYPE	SOIL COLUMN	DESCRIPTION (TYPE SOIL, COLOR, ETC.)	REMARKS (DRILLING FLUID, WATER LEVELS, ETC.)
			Fill - Brn. silt w/shells, clay to 3 feet	Drilled and sampled "dry" to first water
5			Gray clay w/Fe specks, tr. silt, frim, lt. gray w/root hairs @ 4 ½ ft. Siltier and wet @ 6 ft (CH-CL)	
	ST		Lt. gray w/brown mottling, clayey silt, saturated. (ML-CL)	▽ Water @ 8 ft. Drilling w/"revert" below 8'.
10			Gray silty, very fine sand to 18 ½ ft. w/ occasional thin clay laminae. Root hairs at 10 - 18 ½ ft. (SM)	
15	SS			
			Creme-gry. clay w/roots, twigs. (CH)	
20			As for 8 ½ - 18 ½ ft (SM)	
	ST		Clayey silt, tr. sand. (ML)	
			Gray clay (CH)	
25			Gray clayey silt at top w/ trace of very fine sand, to very fine sand w/ silt-clay laminae, wood frags-organics @ bottom. (SM-ML)	
30		TD 30 ft		

EXPLANATIONS

A-AUGER CUTTING
SS-SPLIT SPOON
ST-SHELBY TUBE
WS-WATER SAMPLE

oo CALCAREOUS NODULES
xx BROKEN-CRUMBLY
··· FE (IRON) GRANULES
— HEAVY OXIDATION LAYER
@ SHELLS

LEGEND

CLAY GRAVEL
SAND SILT

KED KEN E. DAVIS ASSOCIATES

BORING LOG

SHEET 1 OF 1

SITE American Cyanamid PROJECT NO. 83-297 HOLE NO. MW-16 GROUND EL. _____

STATE Louisiana COUNTY Jefferson LOCATION Adj. WDW 4 T.D. 32 ft

DEPTH/EL. OF WATER & DATE MEASURED: 13 ft. / 7/20/83 date; _____ ft. / _____ date

LOGGED BY John Webb START 8:00 A 7/20/83

WEATHER Hot, humid FINISH 1:20 P 7/20/83

DEPTH	SAMPLE TYPE	SOIL COLUMN	DESCRIPTION (TYPE SOIL, COLOR, ETC.)	REMARKS (DRILLING FLUID, WATER LEVELS, ETC.)
0	ST		Fill - dense, silty clay w/shell fragments. brown-tan-gray, moist. (CL-CH)	Drilled - sampled "dry" to first water.
5				
10			Light gray, silty clay w/Fe granules wet @ 7 feet. (CL-CH)	
			Vy. silty clay-clayey silt. (SAT) (ML-MH)	▽ Water @ 13 feet. Drilled-sampled w/revert. below first water.
15			Very fine sand-silt-clay mix (laminated) gray.	
			Loosing clay, becoming sandier.	
20			Very fine sand w/trace silt w/laminae and apparent cross-bedding, firm. (ML-SM-SP)	
25	SS		Stiff, gray clay. (CH)	
	ST		Fine sand, gray, glauconitic, micaceous to total depth. (SP)	
30		TD 32 ft	NOTE: All sand w/trace mica-glauconite.	

EXPLANATIONS

A-AUGER CUTTING
SS-SPLIT SPOON
ST-SHELBY TUBE
WS-WATER SAMPLE

oo CALCAREOUS NODULES
XX BROKEN-CRUMBLY
··· FE (IRON) GRANULES
— HEAVY OXIDATION LAYER
@ SHELLS

LEGEND

CLAY, GRAVEL, SAND, SILT

KED KEN E. DAVIS ASSOCIATES

BORING LOG

PROJECT NAME: American Cyanamid

BORING MW-17

PROJECT Nº 84-517

DATE 4/25/84

LOCATION: Westwego, Louisiana

BORING TYPE Standard

ENG./LOGGER KDR/KDR

G.S. ELEVATION _____ COORDINATES _____ N _____ E

ELEVATION (FEET)	DEPTH (FEET)	SPT or P	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	SAMPLE	PROFILE	DESCRIPTION
									FILL, SILTY CLAY, tan, shells
	5								CL, SILTY CLAY, tan, medium stiff very stiff
	10								CH, CLAY, mottled gray and tan, medium stiff CL, SILTY CLAY, mottled gray and tan, shells in the interval 10 to 12 feet, soft
	15								ML, CLAYEY SILT, gray, rootlets, medium stiff,
	20								ML, SANDY SILT, gray, fine, loose to medium dense.
	25								ML, CLAYEY SILT, gray, clay lenses in the interval 24 to 26 feet, soft
	30								fine sand pockets in the interval 28 to 30 feet
	35								ML, SANDY SILT, gray, fine, dense Boring terminated at 40 feet.

SHELBY TUBE

SPLIT SPOON

AUGER

NO RECOVERY

▽ INITIAL WATER LEVEL

▼ WATER LEVEL (AFTER 24 hrs.)

SPT - STANDARD PENETRATION TEST (BLOWS/FT)

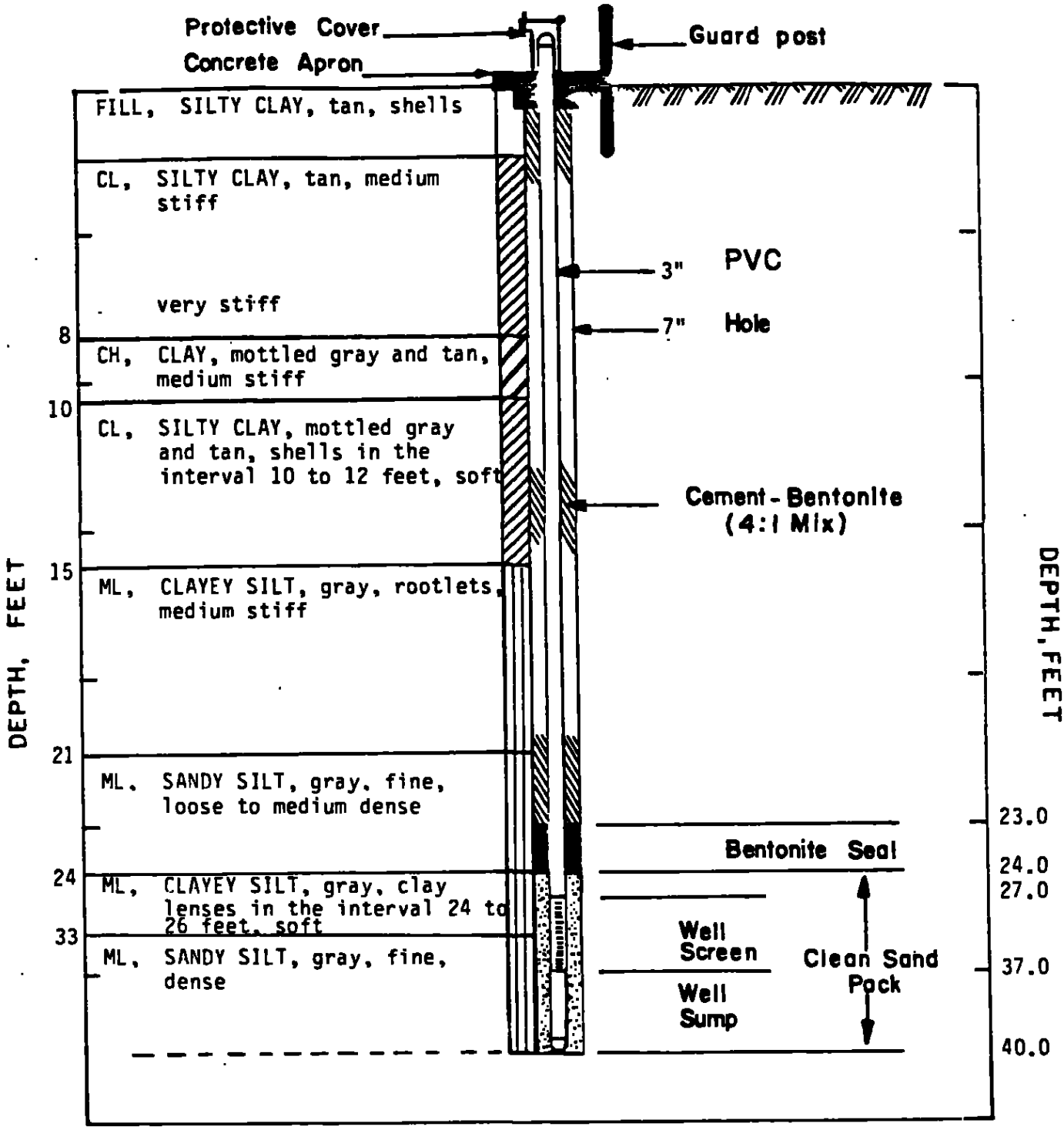
P - POCKET PENETROMETER READING (TSF)

GID INC

REMARKS:

PLATE Nº 1

MONITORING WELL



Boring No. B-17
Well No. MW-17

AMERICAN CYANAMID
WESTWEGO, LOUISIANA

Drawn by	KDR	8-8-84	Proj No. 84-517-A
Engineer	KDR	8-8-84	
Checked by	[illegible]	8/16/84	Fig No. 2

GID

Gulf Drilling Co., Inc.
Geotechnical Investigations
822 Necaho Ave. Baton Rouge, La. 70802

BORING LOG

PROJECT NAME: American Cyanamid

BORING MW-18

PROJECT Nº 84-517-A

DATE 6-7-84

LOCATION: Westwego, Louisiana

BORING TYPE Standard

ENG./LOGGER KDR/KDR

G.S. ELEVATION _____ COORDINATES _____ N _____ E

ELEVATION (FEET)	DEPTH (FEET)	SPT or P	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	SAMPLE	PROFILE	DESCRIPTION
									FILL, SILTY CLAY, mottled dark gray and brown, shells, very stiff
	5								CL, SILTY CLAY, mottled tan and orange, medium stiff
	10								ML, CLAYEY SILT, mottled tan with orange, soft to medium stiff
	15								gray, leaves and plant debris in the interval 16 to 18 feet
	20								trace plant debris
									CL, SILTY CLAY, gray, very soft
	25								ML, CLAYEY SILT, gray, medium stiff
	30								
									CL, SILTY CLAY, gray, silt lenses, soft
	35								CH, CLAY, gray, interbedded thin silt lenses, soft
									Boring terminated at 36 feet.

SHELBY TUBE

SPLIT SPOON

AUGER

NO RECOVERY

▽ INITIAL WATER LEVEL

▼ WATER LEVEL (AFTER 5 min.)

SPT - STANDARD PENETRATION TEST (BLOWS/FT)

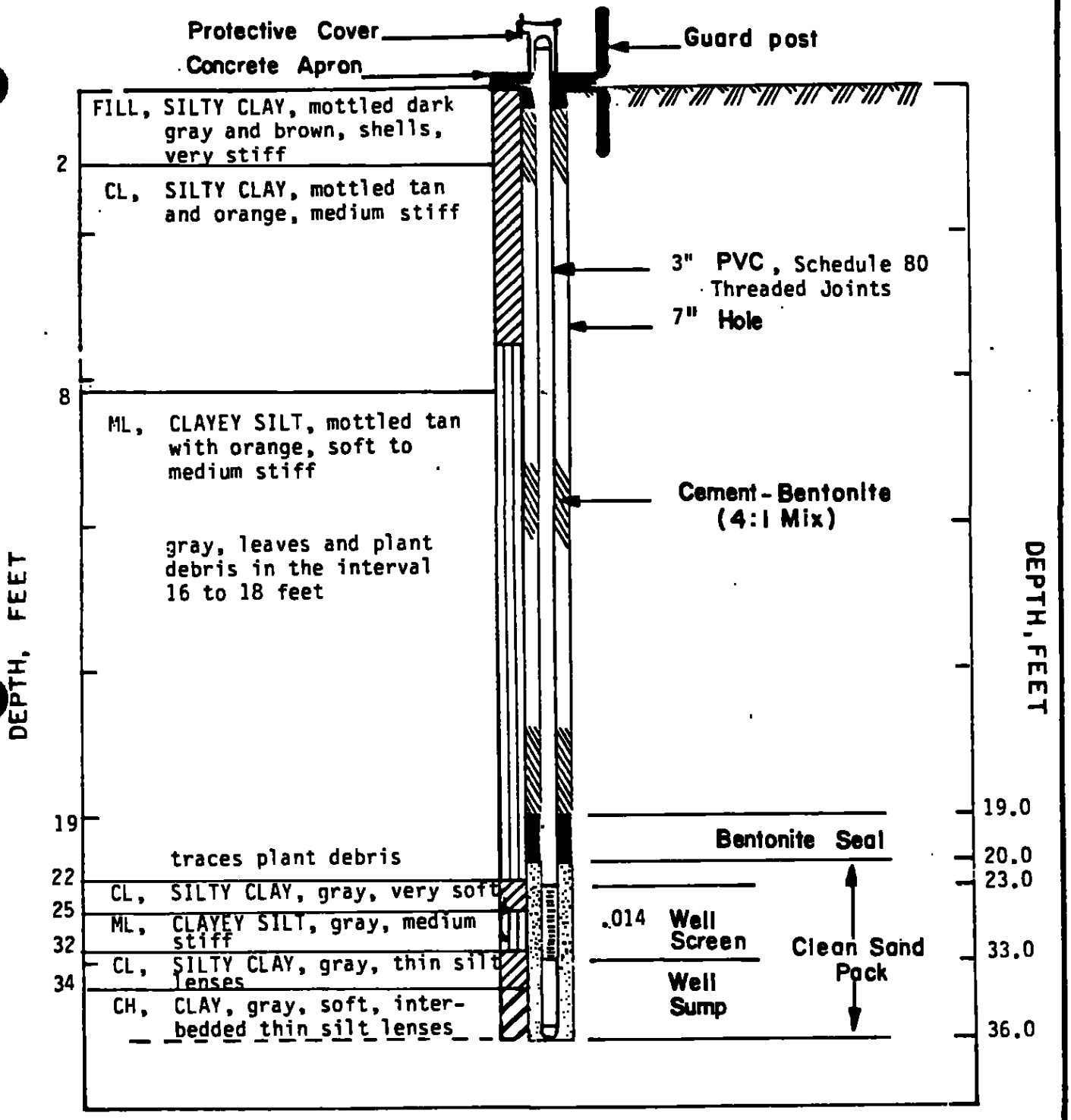
P - POCKET PENETROMETER READING (TSF)

GID

REMARKS:

PLATE Nº 3

MONITORING WELL



Boring No. B-18
Well No. MW-18

AMERICAN CYANAMID
WESTWEGO, LOUISIANA

Drawn by	KDR	6-22-84	Proj No. 84-517-A
Engineer	KDR	6-22-84	
Checked by	ASE	6/11/84	Fig No. 4

GID
Gulf Drilling Co., Inc.
Geotechnical Investigations
822 Neosho Ave. Baton Rouge, La. 70802

515 North Adams
Tallahassee Florida 32301
904-222-3197

Woodward-Clyde Consultants

October 15, 1984

Mr. Darrel Primeaux
Hydrologist
Woodward-Clyde Consultants
Post Office Box 66317
Baton Rouge, Louisiana 70896

Dear Mr. Primeaux:

Enclosed are the geophysical logs, per your request, on the two monitoring wells, MW-1 and MW-8 at the American Cyanamid Company plant on October 11, 1984, in Westwego, Louisiana. The purpose of the borehole geophysical logging program was to assess the quality of the bond of the 3-inch PVC Schedule 40 casing to the cement, in the annular space (if present), and the bonding of the cement to the formation.

Approach

The borehole geophysical equipment used at the American Cyanamid site is a Mount Sopris Series III down hole system. This equipment has the capability of logging small diameter wells similar to the wells requested for the project. The cement bond log employs sonic (acoustic) principals in which a transmitter repeatedly sends signals through the borehole fluid and is then transmitted along the casing. Two receivers, in the upper portion of the probe, then record the travel time and amplitude of the transmitted signal. The travel time is related to the porosity and lithology (or type of casing) near the borehole. Water and/or highly porous formations have a significantly slower travel time than casing or cement. Compensated density borehole logs were also run to assess changes in density at two different radii of investigation (approximately 4" and 12"). Density logs with short investigative radii have been used successfully in the petroleum industry to determine the presence of cement behind oil well casings.

Quality assurance was maintained by running duplicate logs, prior to the final run and then compared for similarity.

Interpretation

It is my interpretation from the acoustic and density borehole geophysical logs that neither MW-1 or MW-8 has a "good" cement seal along any portion of their respective well casings. This is not to say that the wells were

not originally cemented, but the cement was not tightly bonded to the casing at the time the logs were run. A major cause of poor cement bonding, especially in PVC wells, is the inability of the cement grout to adequately "wipe or scrape" the drilling mud from the PVC during the grouting process. Also the heat of hydration and subsequent cooling and contraction of the PVC may have caused a micro annulus to form which would be recorded on the amplitude log in the same manner as if there were no cement present in the annulus.

The amplitude log of MW-8 appears to show either some degree of bonding between 40 and 68 feet (top of screen) or a log signature similar to wells having highly compacted fine grained quartz sands filling the annular space. "Good" cement bonding would be displayed on the amplitude log below or less than the 10 percent line on the "percent unbonded pipe signal" scale. The sharp deflections pegged to the left hand side of the log are "cycle-skips" (signals remaining from the wave previously transmitted and should not be interpreted as sections of good bonding.

Two observations are apparent from the dual spaced (compensated) density logs; 1) the deep spaced density log, reading to a depth of about 12 inches into the formation, indicates that the formation material decreases in density towards the top of the borehole which may be due to an increase in silt and/or clayey materials; and 2) the short spaced or shallow density log, remains relatively constant throughout the length of the borehole, indicating the material immediately adjacent to the borehole (within 4 inches) is relatively uniform. The exact density of this material cannot be calculated since calibration curves are not available for this diameter pipe (3-inch) or PVC.

Additional information supporting the conclusion of "poor" bonding, but not available in written form, is the acoustic wave patterns observed on the oscilloscope while the log was being run. In almost all cases the secondary waves were highly diffused and also not indicating of good bonding with the proper density cement.

If you have any question conerning the logs or interpretation, please do not hesitate to call.

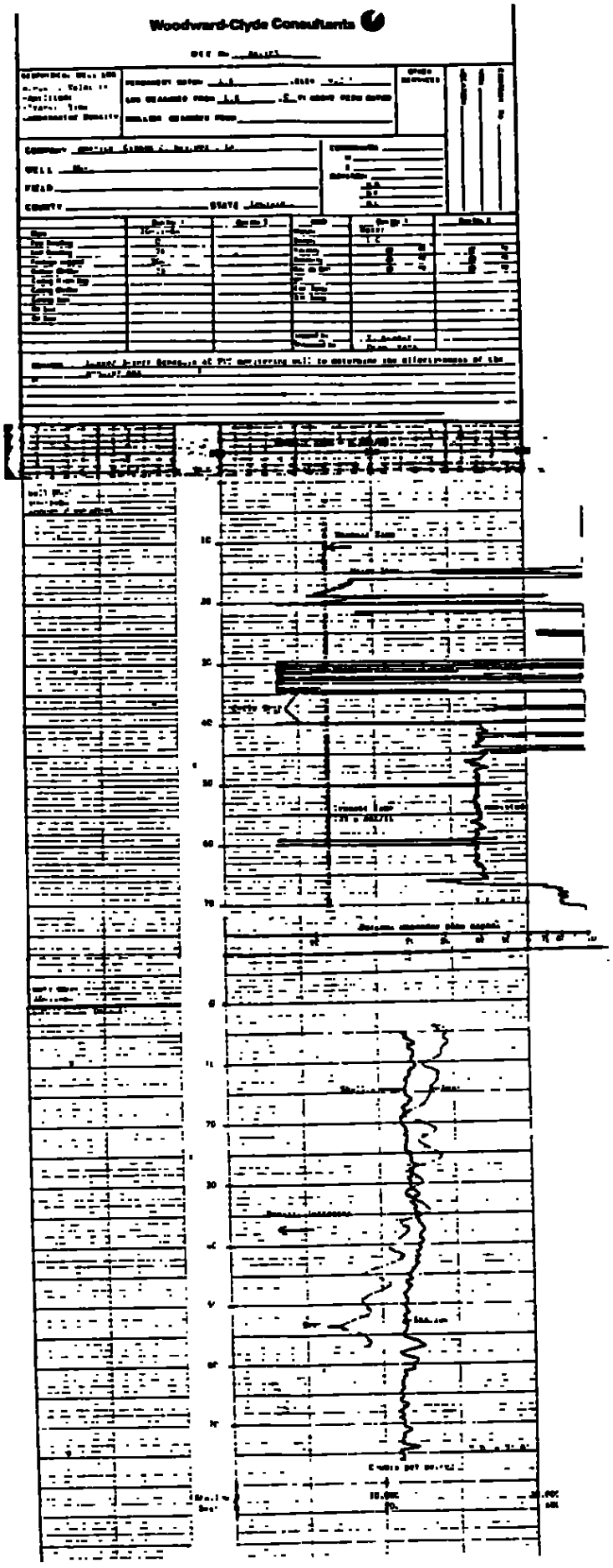
Sincerely,

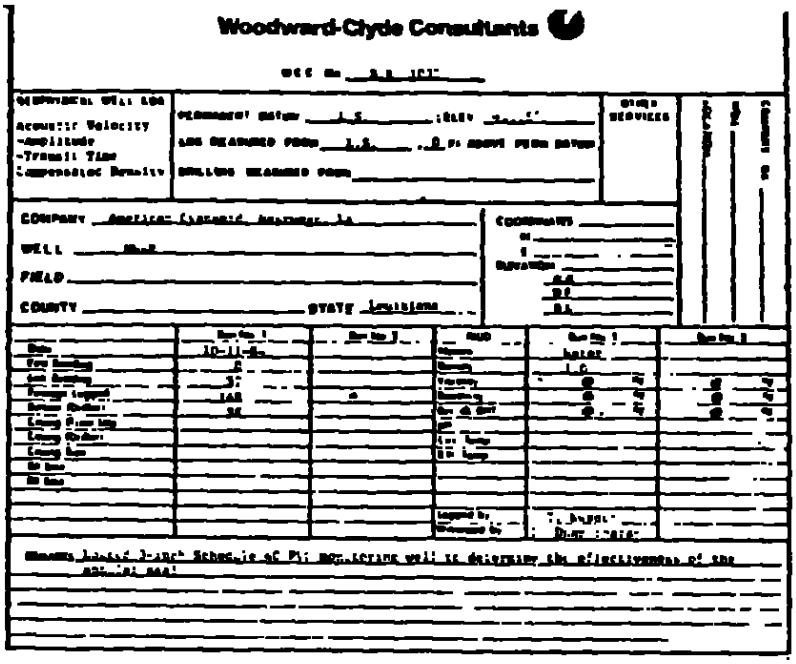
Thomas Kwader

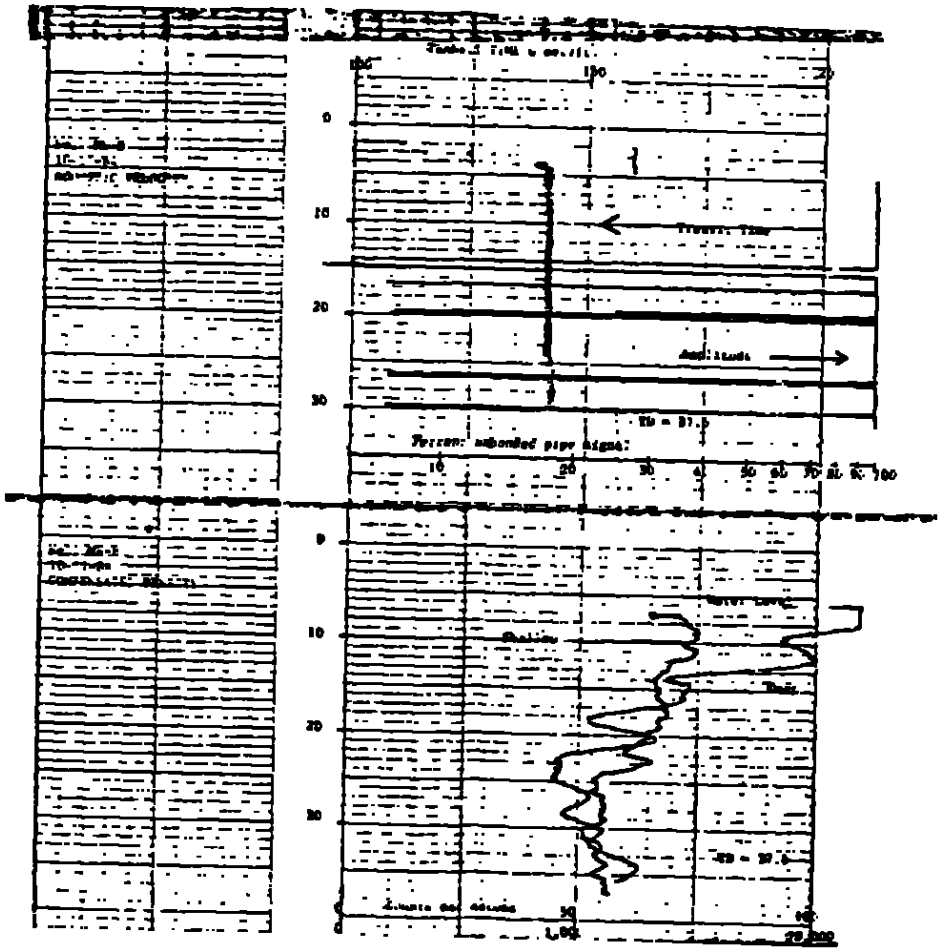
Thomas Kwader, Ph.D.
Hydrogeologist

TK/mjr

Certified Well Log Analyst (SPWLA) Number 5851


Woodward-Clyde Consultants


Woodward-Clyde Consultants
COMPANY
WELL
FIELD
COUNTY
STATE Louisiana
COORDINATES
ELEVATION
Acoustic Velocity
-Amplitude
-Transit Time
Compensated Density
Water Level
Shallow
Deep


Transit Time
Amplitude
Water Level
Shallow
Deep

APPENDIX B
RESULTS OF SLUG TESTS

Monitoring Well	Transmissivity T (ft^2/sec)	Permeability P (ft/sec)	(cm/sec)
MW-1	$1.90*10^{-3}$	$1.6*10^{-4}$	$4.9*10^{-3}$
MW-2	$1.1*10^{-4}$	$9.5*10^{-6}$	$2.9*10^{-4}$
MW-4	$4.6*10^{-4}$	$3.6*10^{-5}$	$1.1*10^{-3}$
MW-6	$1.2*10^{-4}$	$1.1*10^{-5}$	$3.2*10^{-4}$
MW-9	$1.5*10^{-4}$	$1.3*10^{-5}$	$3.9*10^{-4}$
MW-14	$1.6*10^{-4}$	$7.7*10^{-6}$	$2.4*10^{-4}$
MW-15	$1.3*10^{-4}$	$6.2*10^{-6}$	$1.9*10^{-4}$
MW-16	$1.5*10^{-3}$	$7.9*10^{-5}$	$2.4*10^{-3}$
MW-17	$4.3*10^{-4}$	$3.8*10^{-5}$	$1.2*10^{-3}$

LOG OF BORING

PROJECT Ground Water Investigation

LOCATION Westwego, Louisiana

CLIENT American Cyanamid Company

BORING MW-19
FILE W4C5157
DATE 10/10/84
TECHNICIAN RWS
APPROVED [illegible]
PAGE 1 of 2

DRY AUGERED 0' to 8'

WASH BORED 8' to Bottom

Free water encountered at 8'.
Water at 2' after 10 minutes.

DEPTH (FEET)	SAMPLE	S.P.T. (B/FT) OR PEN. PEN. (TSF)	COMPRESSIVE STRENGTH (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	L.L. (%)	P.I. (%)	DESCRIPTION OF STRATUM
0								Auger through shell and gravel (Fill)
								Medium gray, brown and tan CLAY, moist (CH/CL)
5								
								Soft gray and tan Silty CLAY, wet (CL/ML)
								---becoming medium with clay and clayey silt layers
10								---alternating layers of medium gray, brown and tan clay, silty clay and clayey silt, gray clay at 11½'
								Soft gray Silty CLAY with clayey silt layers (CL/ML)
15								
								---becoming clay at 19½'
20								Medium gray CLAY (CH/CL)
								---with silty clay layers
25								Soft gray Silty CLAY with clay layers (CL/CH/ML)
								---alternating layers medium gray clay and silty clay with large sand seams and clayey silt at 28'
30	X							Gray Silty CLAY (CL/CH/ML)
	X							---alternating layers gray silty clay, clayey silt and sandy silt with shells, wet
	X							---with clay layers
35	X							
	X							---with sandy silt and silty sand
	X							---with clay at 40'
40								

X-pushed splitspoon

LOG OF BORING

PROJECT Ground Water Investigation

LOCATION Westwego, Louisiana

CLIENT American Cyanamid Company

BORING MW-19
FILE W4C5157
DATE 10/10/84
TECHNICIAN RWS
APPROVED IR
PAGE 2 of 2

DEPTH (FEET)	SAMPLE	S.P.T. (B/FT) OR PRT. PEN. (TSF)	COMPRESSIVE STRENGTH (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	L.L. (%)	P.I. (%)	DESCRIPTION OF STRATUM
40								Gray Silty CLAY (CL/CH/ML) ---alternating layers of gray clay, silty clay and 1" layers wet clayey silt ---with silty sand at 44'
45								Bottom of boring at 44'

GROUND WATER OBSERVATION WELL REPORT

PROJECT American Cyanamid Company

LOCATION Westwego, Louisiana

Date Completed 10/11/84 Original Depth

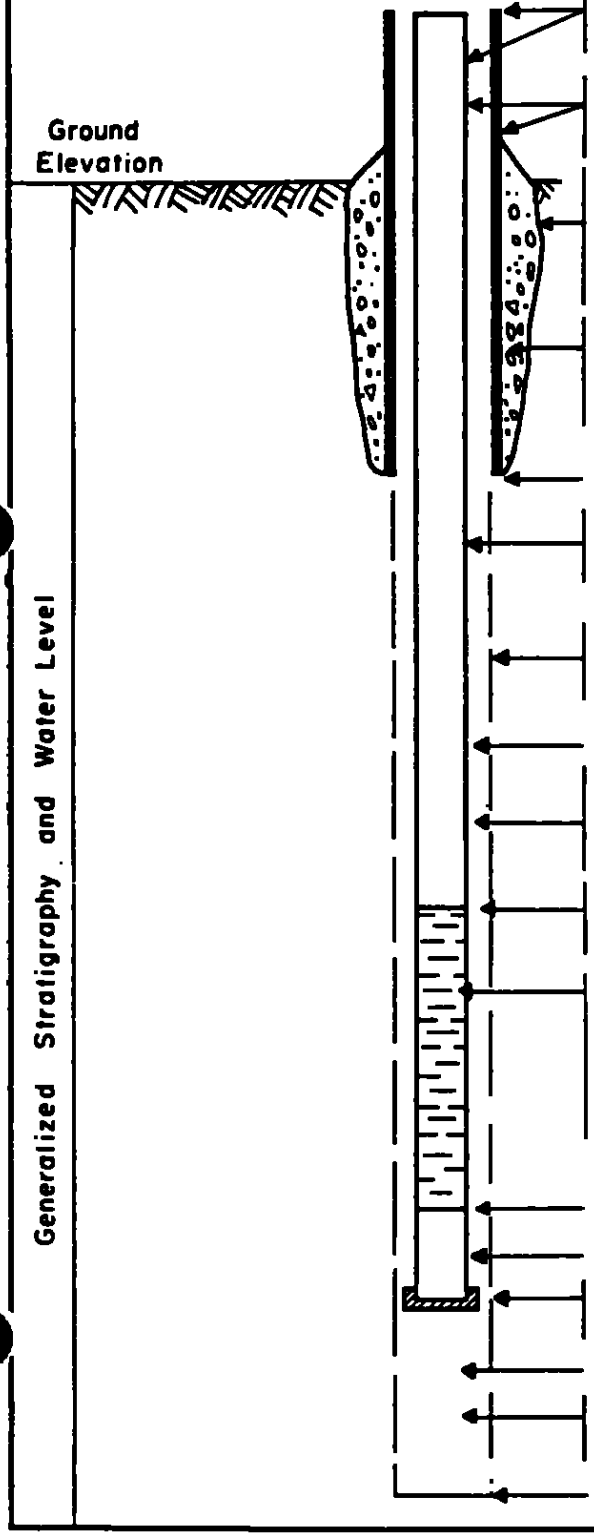
Inspected By RWS Date 10/11/84

Checked By JR Date 11/30/84

Well No. MW-19

Aquifer

Depth Interval 25-40 Foot Zone



Elevation of top of ~~surface-casing~~ / riser pipe.	-
Height of top of surface-casing / riser pipe above ground surface	2'4"
Depth of surface seal below ground surface	2'
Type of surface seal: 3 foot square x 4" thick concrete slab	
I.D. of surface casing.	8"
Type of surface casing: concrete	
Depth of surface casing below ground	2'
I.D. of riser pipe.	3"
Type of riser pipe: Sch 40 PVC with threaded flush joints	
Diameter of borehole	8"
Depth of borehole	44'
Type of backfill: Cement/bentonite grout	
~~Elev.~~/depth top of seal.	21'
Type of seal: Bentonite pellets	
~~Elev.~~/depth bottom of seal.	23'
Type of sand pack. #375 Blasting Sand	
Depth of top of sand pack.	23'
~~Elev.~~/depth top of screened section.	25'7"
Type of screened section: Sch 40 PVC	
Discribe openings No. 10 slots (.010")	
I.D. of screened section.	3"
~~Elev.~~/depth bottom of screened section.	39'8"
Length of blank section.	1'
~~Elev.~~/depth bottom of plugged blank section.	40'8"
~~Elev.~~/depth bottom of sand column.	44'
Type of backfill below observation pipe. #375 Blasting Sand	
~~Elev~~/depth of hole.	44'

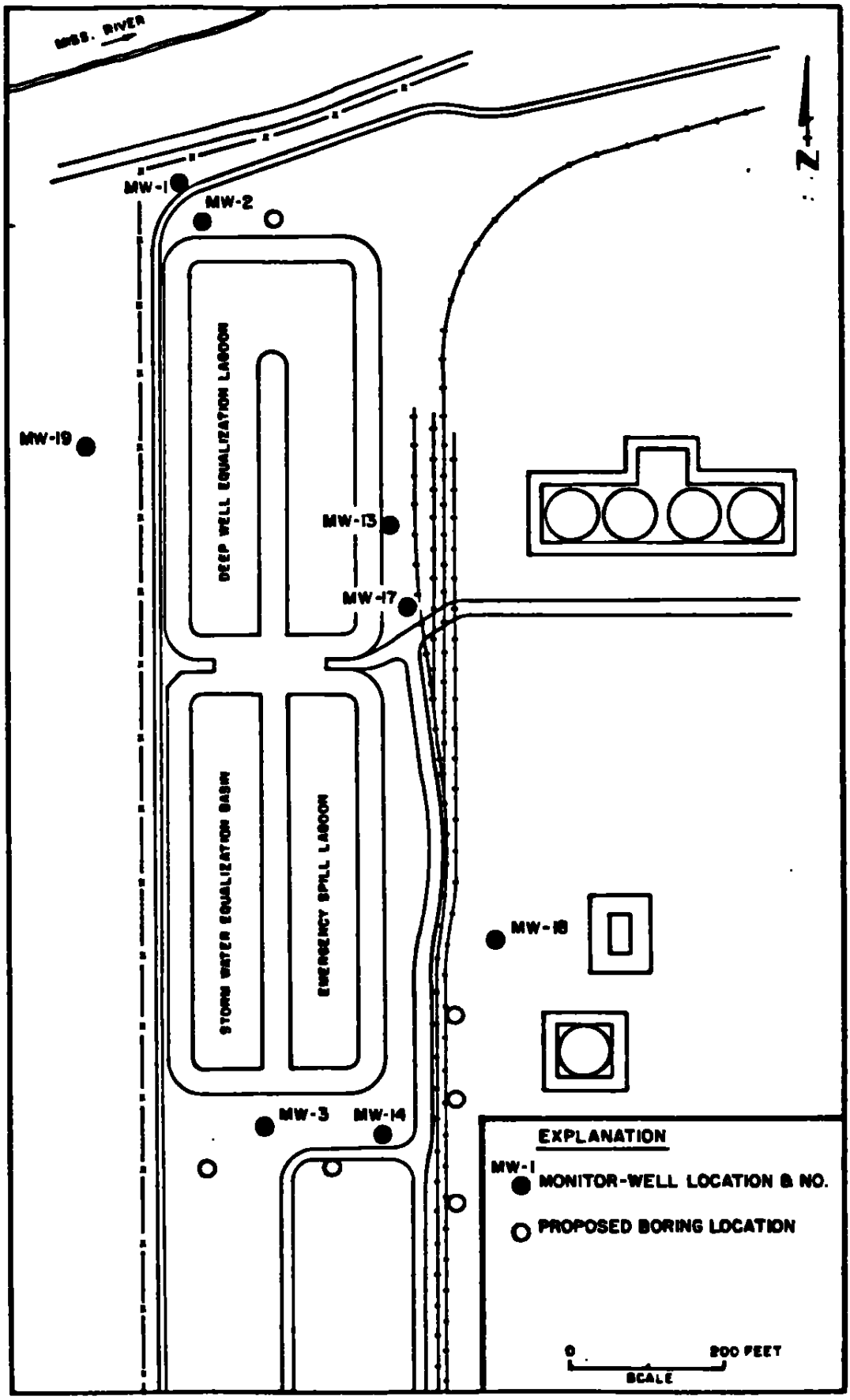


FIGURE 4. PROPOSED BORING LOCATIONS - LAGOON AREA.

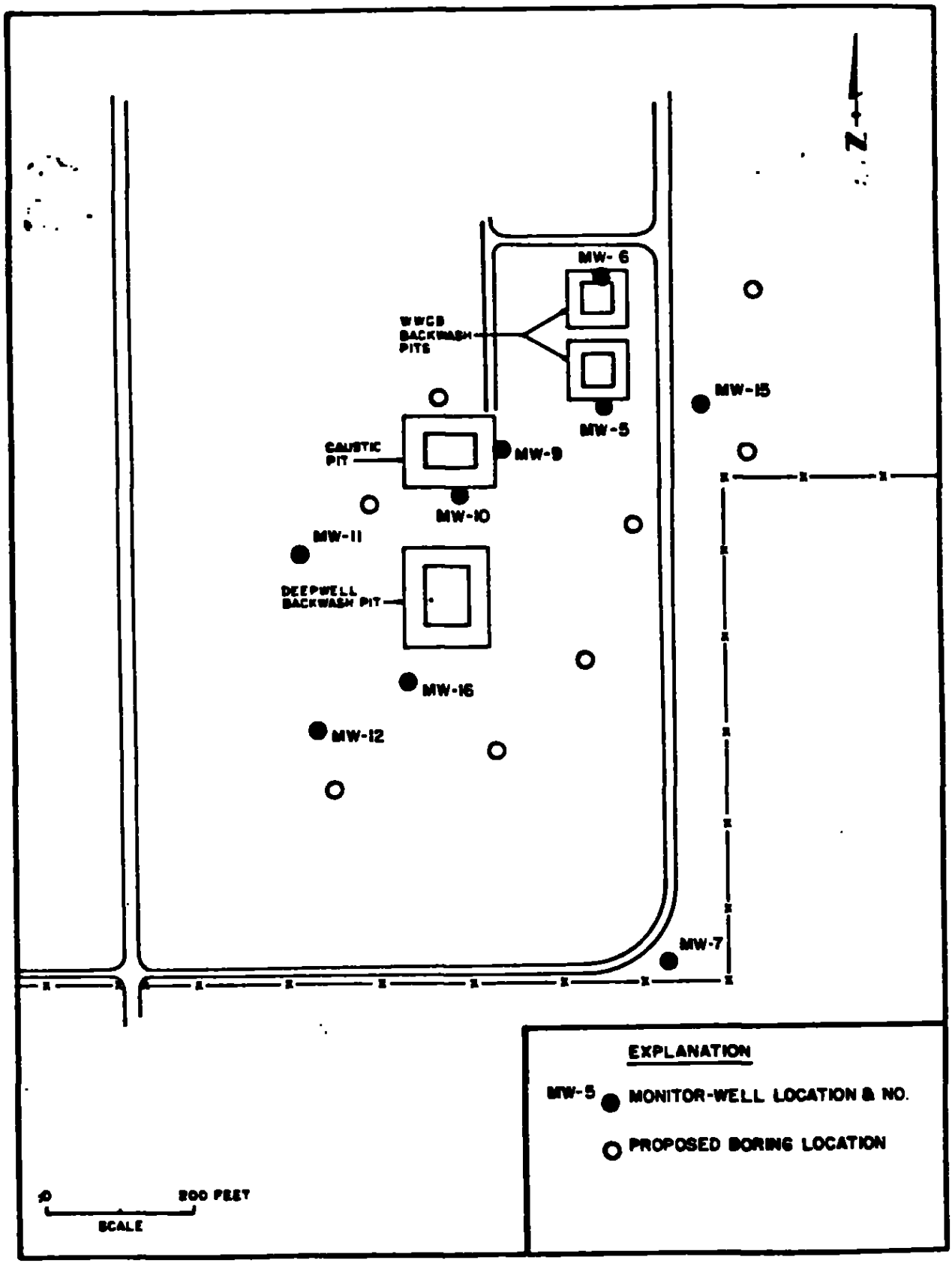


FIGURE 5. PROPOSED BORING LOCATION MAP - PIT AREA.

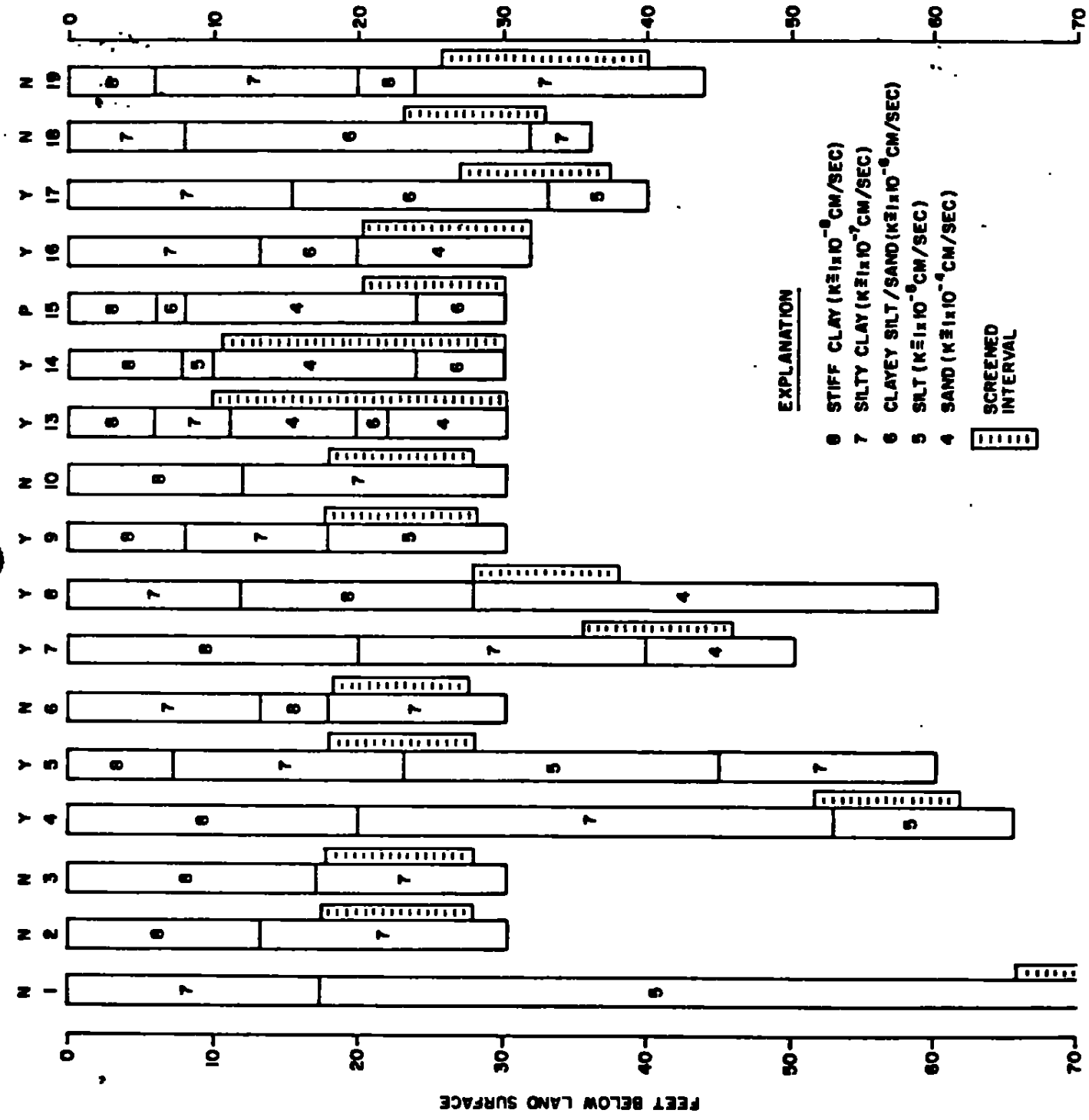


FIGURE 2. GENERALIZED SOIL BORING DATA AND WELL SCREEN SETTINGS.

FINAL REPORT

THE HYDROGEOLOGIC AND RCRA MONITORING NETWORK
AMERICAN CYANAMID COMPANY
Fortier Plant - Westwego, Louisiana

Prepared for:

AMERICAN CYANAMID COMPANY
Westwego, Louisiana

December 9, 1985

Prepared by:

GERAGHTY & MILLER, INC.
11816 Sunray Drive
Baton Rouge, LA 70816
(504)292-1004

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LIST OF FIGURES

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INTRODUCTION

American Cyanamid Company (ACC) owns and operates a plant in Westwego, Louisiana, at the location shown in Figure 1. ACC maintains a ground-water monitoring system around its two Hazardous Waste Management Areas (HWMAs). During December, 1984 Geraghty & Miller, Inc., (G&M) was retained by ACC to evaluate the existing ground-water monitoring program as required by an Order issued by the Louisiana Department of Environmental Quality (DEQ) on September 10, 1984 and DEQ Hazardous Waste Regulation 23.37(m). Although the analytical results indicated a statistically significant difference in pH and/or specific conductance values, ACC strongly felt that the results did not indicate ground-water contamination and requested that G&M review their RCRA monitoring program.

G&M's initial assessment concluded that the wells were not properly located and/or constructed to be able to effectively determine ground-water contamination by accepted RCRA method (Student t-Test). G&M recommended that additional geologic data be obtained and that the existing ACC monitoring wells be tested for their ability to produce consistent, statistically valid, results.

This report summarizes the geologic information that was collected by G&M and an assessment of the hydrogeology of the ACC facility. The hydrogeologic assessment provided the

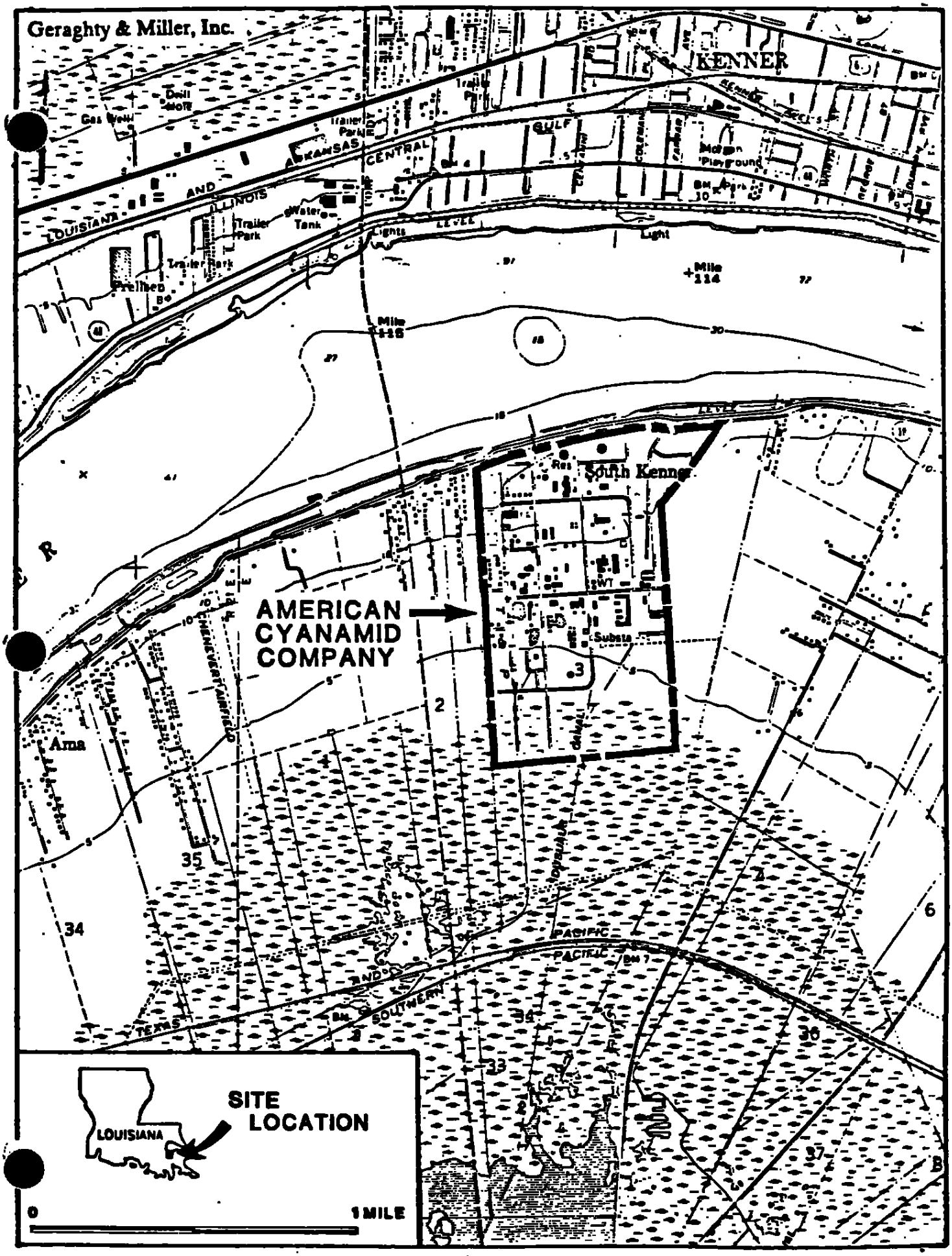

FIGURE 1 LOCATION MAP OF ACC-WESTWEGO, LOUISIANA.

basis for modifications that were made to the detection monitoring system, such as suitable locations and screen intervals for new monitor wells. The wells have been installed and serve as an early warning system for the detection of potential ground-water contaminants that may migrate laterally away from the two HWMA impoundments.

BACKGROUND

In November 1981, prior to G&M's involvement, ACC had attempted to establish background hydrogeologic conditions, at the plant site by installing soil borings and a ground-water monitoring system designed to monitor the two HWMAs. The lagoon area located in the northwestern portion of the plant and the pit area located in the south central portion of the plant comprise the two HWMAs. The locations of the original RCRA monitor wells and the two HWMAs are shown in Figure 2.

G&M reviewed and evaluated the hydrogeological and well-construction data obtained from the initial wells and determined that some of the wells were not properly located and screened in similar geologic units. It was found that in the lagoon area, upgradient well MW-2 was screened in a silty clay with a hydraulic conductivity (K) of approximately $1x10^{-7}$cm/sec. The downgradient well (MW-14) was screened in a sand with a K of approximately 1×10^{-4} cm/sec. In the pit area, upgradient well (MW-6) was screened in a silty clay and downgradient wells (MW-5 , MW-9 and MW-15) were screened in a sand deposit. Because the upgradient and downgradient wells were constructed in different hydrogeologic units, the ground-water sample analyses obtained from these wells could not be considered comparable.

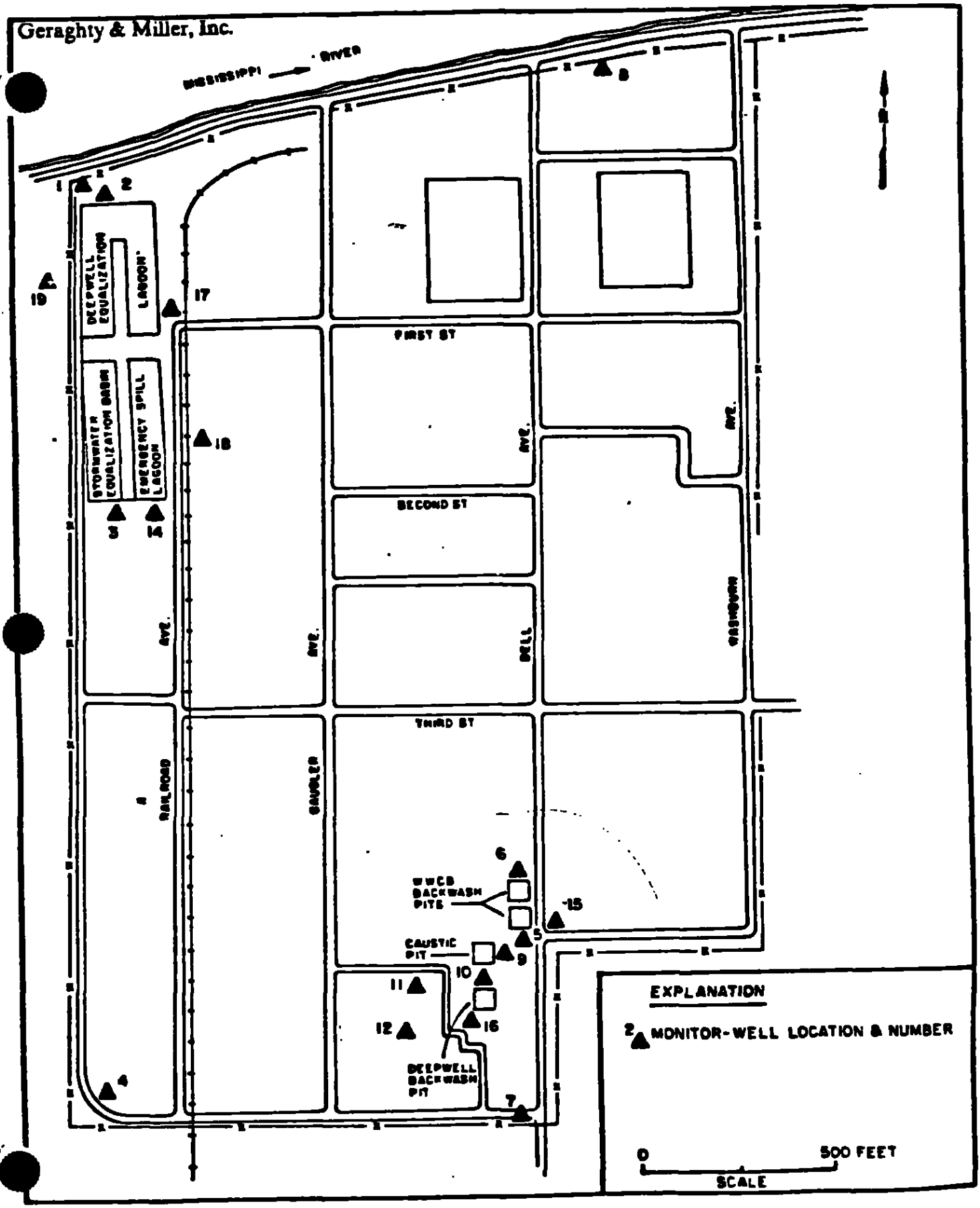

FIGURE 2. LOCATIONS OF ORIGINAL MONITOR WELLS AND WASTE MANAGEMENT AREAS.

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Prior to G&M involvement, it had been concluded from acoustic velocity and compensated density logging tests that monitor wells MW-1 and MW-8 had poor cement bonds between the well casings, cement grout and the soil. It was suggested that if that interpretation were correct, it was not possible to determine the formation from which the water sample was obtained. Because the same well-installation techniques were followed for MW-1 through MW-10, the integrity of all ten wells were in doubt and therefore whether a statistically significant difference had, in fact, been found.

G&M concluded that three tasks would be necessary to properly implement modifications to the monitor-well network. These tasks were:

- Soil Boring drilling program;
- Geotechnical laboratory testing program; and
- Monitor well integrity testing.

A total of 23 continuously sampled soil borings were installed to depths ranging from 35-125 feet below land surface (ft bls) to obtain additional geologic information. Soil samples were described and preserved in the field for future reference and geotechnical testing. Upon completion of each soil boring the borehole was plugged with cement grout from bottom to top. The soil boring locations are

provided as Figures 3 and 4. The lithologic logs from each soil boring (K-1 through K-23) are provided as Appendix A.

Representative soil samples were then selected and analyzed to determine grain size distribution, horizontal and vertical hydraulic conductivity (permeability). The laboratory results are summarized in Table 1. The soil mechanics laboratory reports are provided as Appendix B.

Monitor wells MW-1 through MW-19 were tested for integrity by reviewing the well-construction details, visually inspected; and pumped to obtain water samples that were tested for their ability to produce consistent ground-water quality results. Each well was pumped and tested after up to ten (10) well volumes of water had been removed. Each sample was periodically tested for turbidity, pH and specific conductance. Wells which did not show consistent pH and/or specific conductivity values or had a high or increasing silt content, could not be relied upon to provide reproducible results and were recommended for proper abandonment. A detailed discussion of the monitor-well abandonment program is provided in Appendix C.

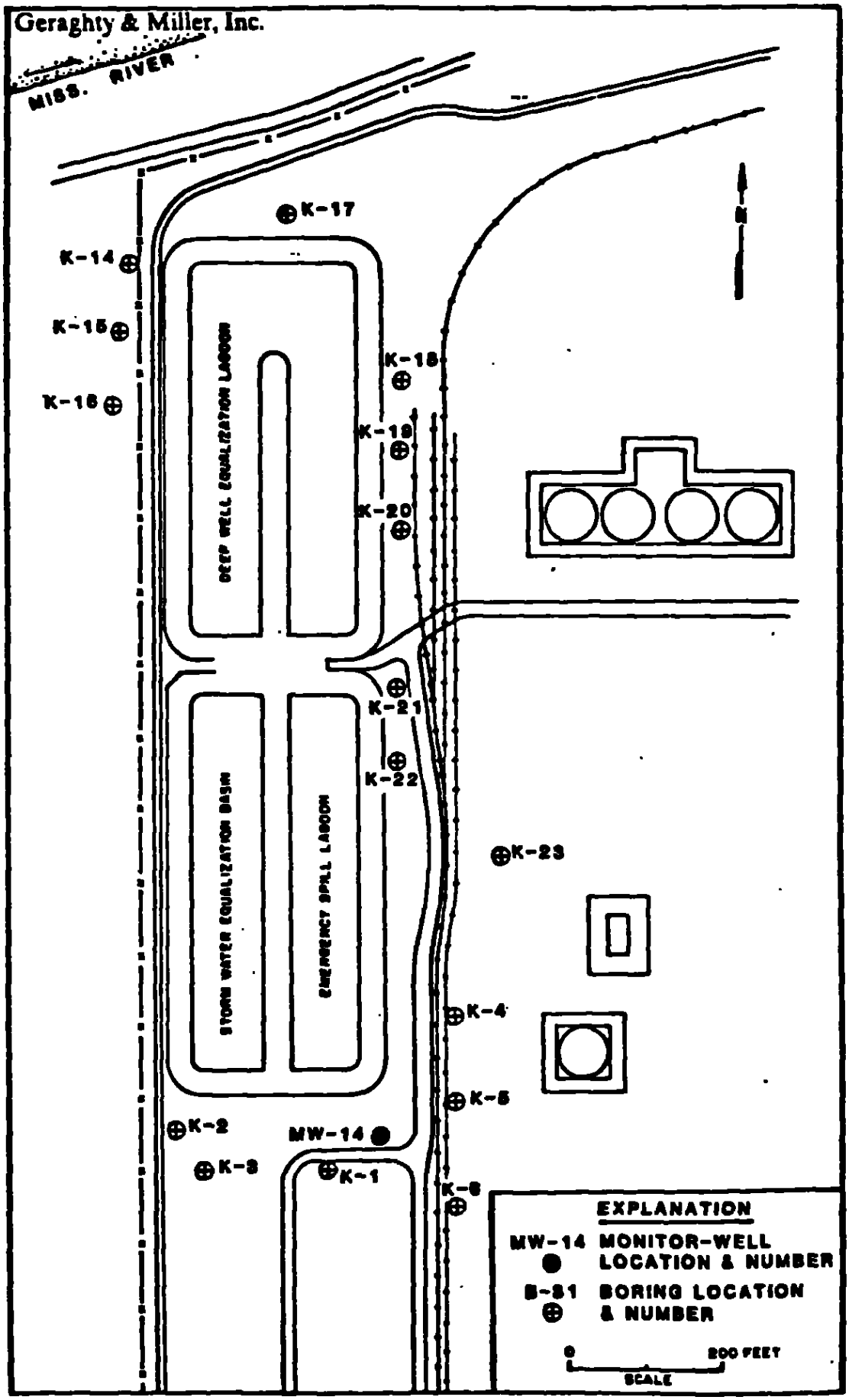


FIGURE 8. BORING LOCATION MAP - LAGOON AREA.

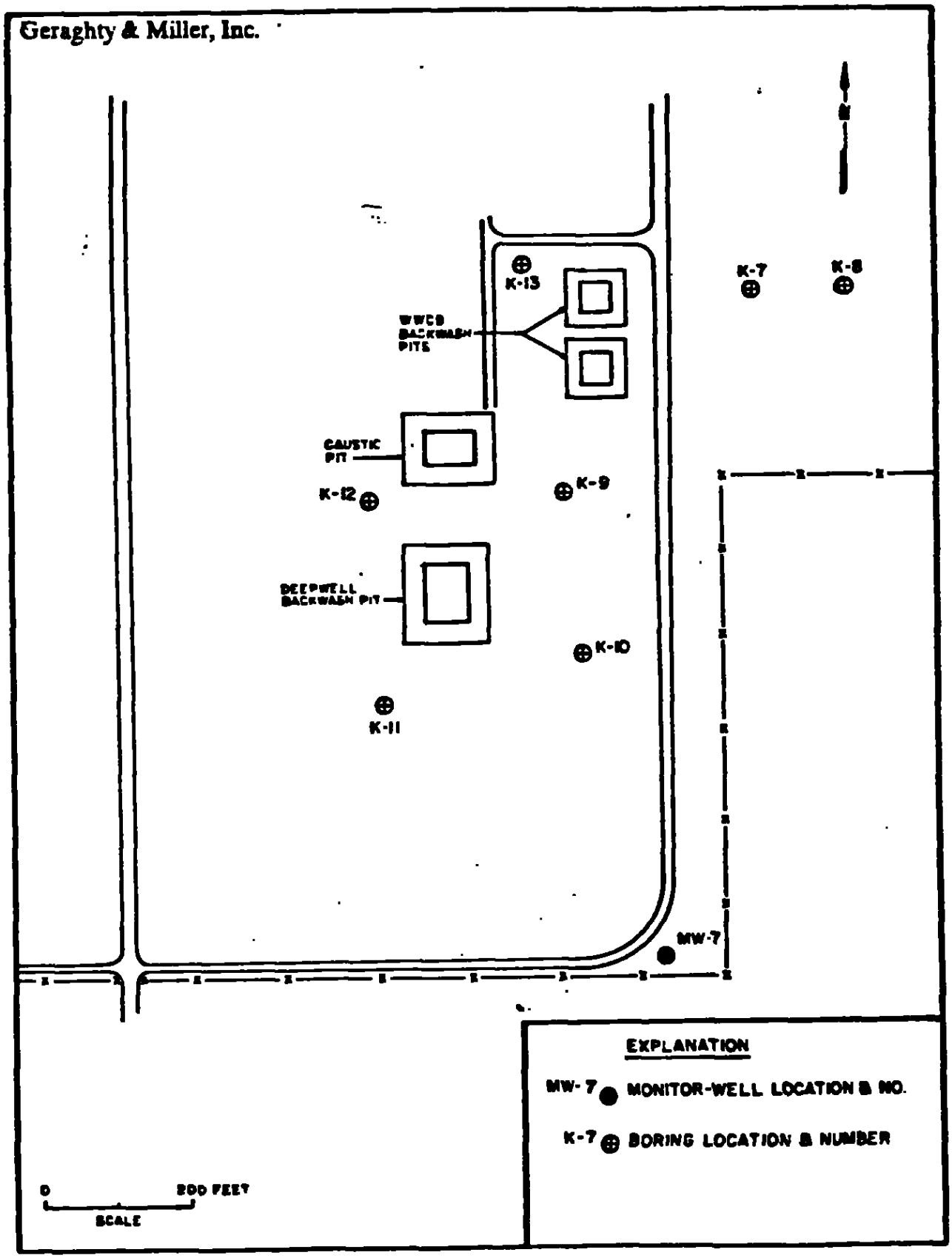


FIGURE 4 BORING LOCATION - PIT AREA.

TABLE 1

Laboratory Test Results of Hydraulic Conductivity
American Cyanamid Company
Westwego, Louisiana

Boring Number	Depth of Sample (ft)	Description	Hydraulic Conductivity (cm/sec)
K-1	38-39	Silty sand	8.7×10^{-5} (H)
K-1	47-48	Sandy clay	4.7×10^{-6} (H)
K-1	123-125	Very stiff clay	1.0×10^{-10} (V)
K-4	17-18	Clayey silt	2.8×10^{-5} (H)
K-13	18-19	Slightly clayey silt	9.9×10^{-6} (H)
K-15	17-18	Silty clay w/sandy silt layers	1.1×10^{-6} (H)

H = Horizontal
V = Vertical

HYDROGEOLOGIC ASSESSMENT

The hydrogeologic assessment was prepared using the following information:

1) ACC injection well logs;

2) U.S.G.S.; Water Resources Bulletins Nos. 9 and 12;

3) Geologic logs from soil borings drilled during the site investigation and construction of the initial monitor wells;

4) Geologic Logs of 23 soil borings (K-1 through K-23) installed by G&M during this project (Appendix A);

5) Laboratory hydraulic conductivity and grain-size analyses of selected soil samples (Appendix B).

Regional Geology

The ACC Fortier plant is located in the geologic region referred to as the Mississippi Embayment. This basin contains at least 30,000 feet of sediments which underlie the Louisiana coastal area. These sediments exhibit a gentle slope southward. These sediments are composed of basinward-thickening wedges of sand and shale. In the vicinity of the ACC plant site four (4) fresh water aquifers exist; the "200-foot", "400-foot", "700-foot" and "1,200-foot" aquifers. The "700-foot" aquifer is of greatest importance for water supply because of its relatively low chloride concentration. The "200 and 400-foot" aquifers are used primarily to supplement the "700-foot" resources. The "1,200-foot" aquifer is currently used little due to its slight to high

chloride concentration. The base of fresh water, 3,000 ppm Total Dissolved Solids (TDS), is at approximately 900 ft bls.

Below 1,100 feet beneath the ACC plant site, the aquifers are not suitable as ground-water supplies due to TDS concentrations greater than 10,000 ppm. At present the "2,400-foot", "3,000-foot", "4,200-foot", "G", "4,700-foot", "4,800-foot" and "5,300-foot" aquifer sands are capable of being used as zones for the injection of waste waters. Presently the "2,400-foot", "3,000-foot" and "4,200-foot" aquifers are being utilized for this purpose. Confining layers of thick shales separate and are interbedded with these sands to a depth of over 6,600 ft bls. A geologic column of the sediments beneath the ACC site is provided as Figure 5.

Site Specific Geology

The nature of the subsurface deposits underlying the ACC plant site has been explored by about 75 test borings (23 of which were added by G&M) to depths of up to 125 ft bls. The boring logs indicate that primarily fine-grained alluvial deposits exist beneath the site to a depth of about 125 ft bls. Typically soils are very fine grained near the land surface and become coarser with depth. Generally, the geologic units consist of an uppermost deposit of stiff clay from the surface to a depth of about 10 to 20 feet, this is underlain by a relatively more permeable zone of silty clay which grades into a silt and a sand, and is referred to as the Point Bar aquifer.

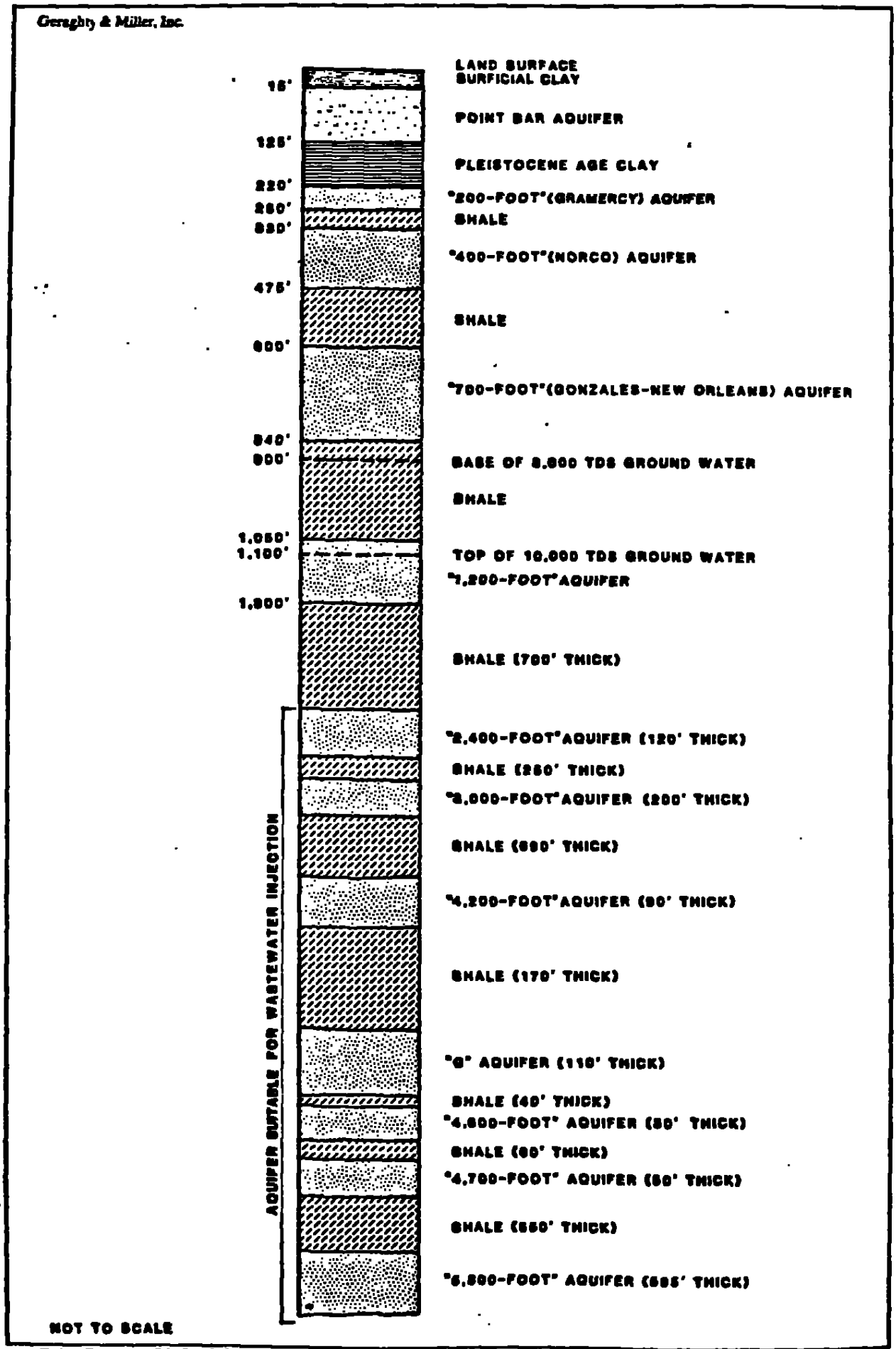


FIGURE 5. GEOLOGIC COLUMN OF SEDIMENT BENEATH THE AMERICAN CYANAMID-FORTIER PLANT.

It ranges in thickness from about 79 to 115 feet as shown in borings K-7 and K-1 respectively, beneath the plant site. A very stiff, clay (Pleistocene age), was found at about 123 ft bls, as shown in boring K-1. This clay is very low in permeability and forms the base of the Point Bar aquifer. Cross sections, constructed using the G&M soil boring data, show the subsurface stratigraphic relationships beneath each of the HWMA impoundments. The cross sections are provided as Figures 6, 7 and 8 for the lagoon area and as Figures 9 and 10 for the pit area. The lithologic logs of the 23 boreholes logged by G&M are provided as Appendix A.

Site-Specific Hydrogeology

The pit and lagoon HWMA at ACC are constructed in a stiff surficial clay which averages about 15 feet in thickness. The potential flow path for contaminated groundwater is initially vertically downward through the unsaturated zone and then laterally through the uppermost permeable deposits which exist within the saturated zone; a relatively permeable silt is encountered at an average depth of 15 to 30 ft bls. This silt marks the top of the Point Bar aquifer. The sediments in this aquifer generally become coarser with depth grading into a silty sand and sand. G&M believes that the uppermost portion of this aquifer should be monitored to detect contaminant migration at its earliest possible occurrence.

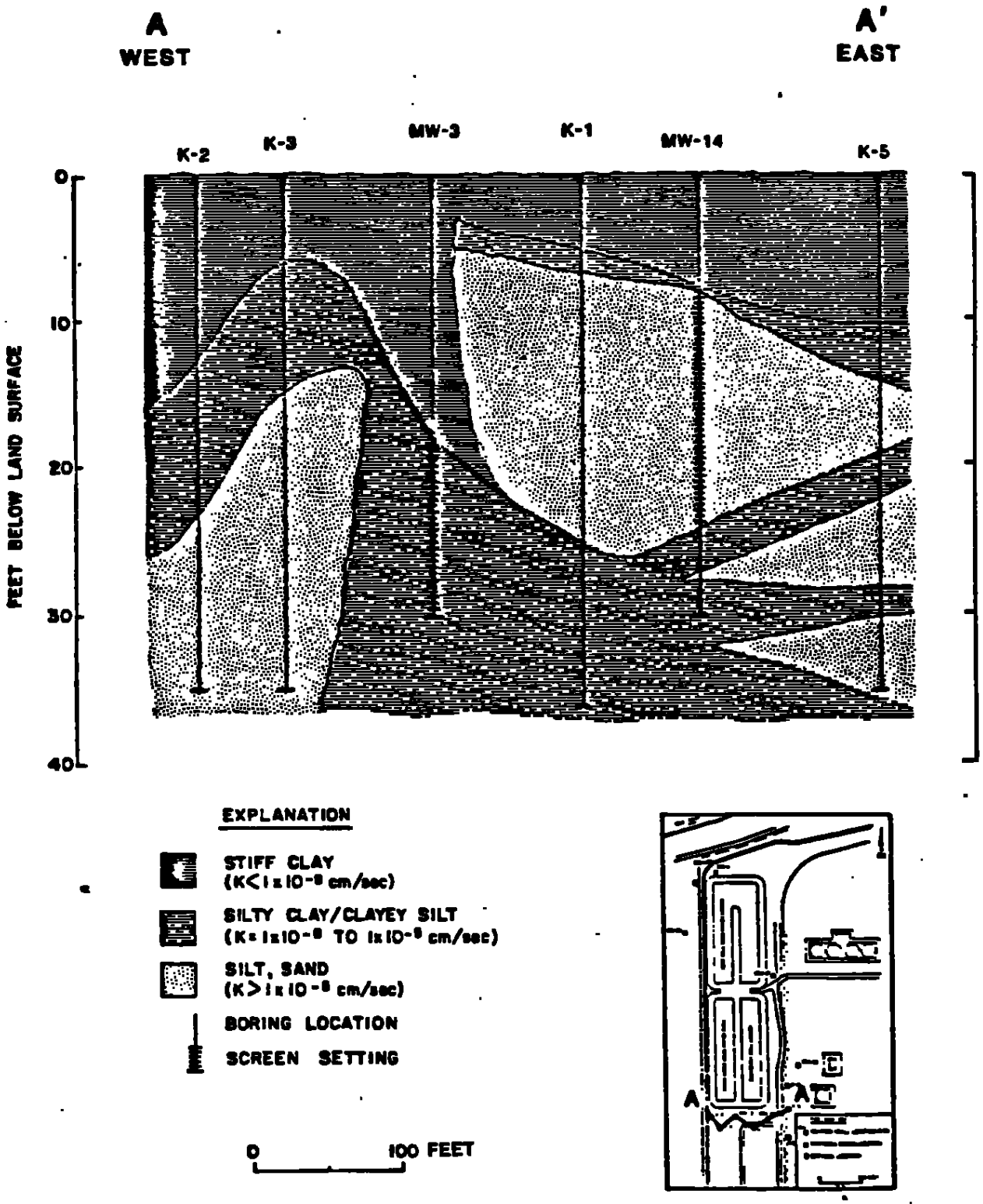
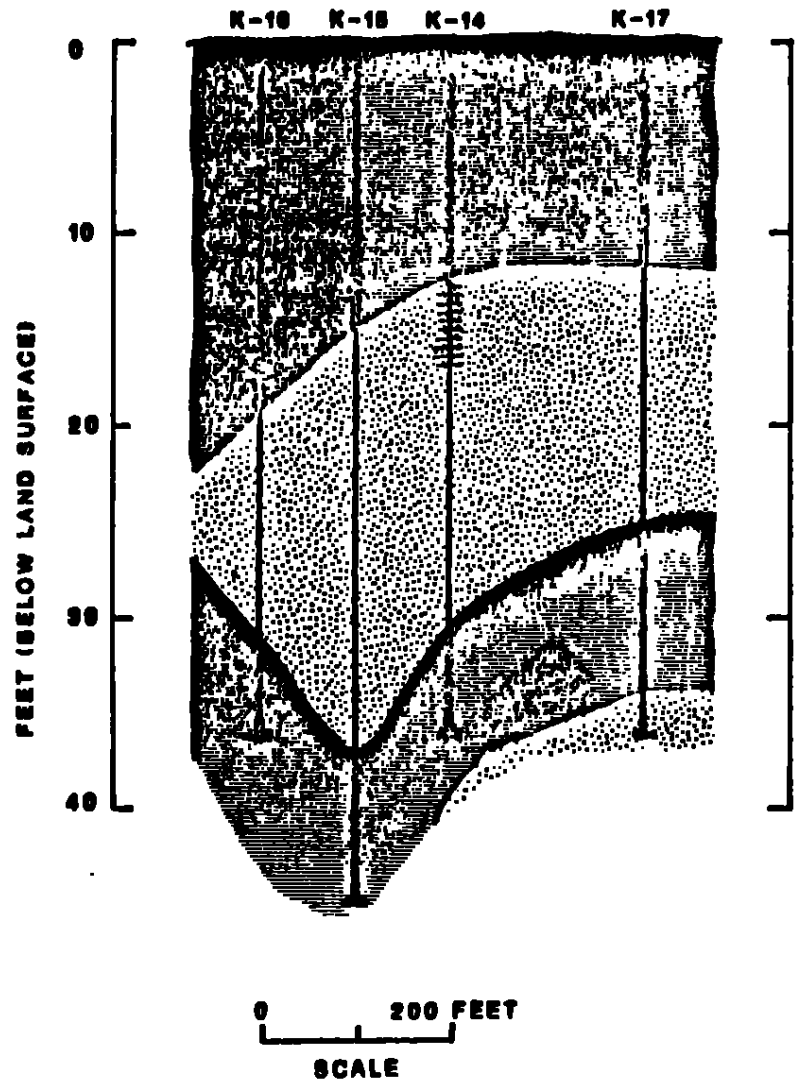
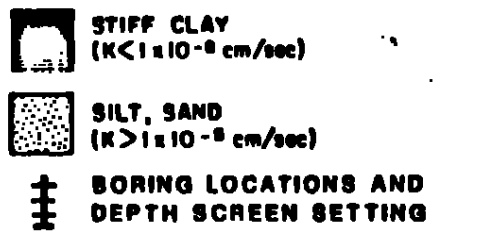


FIGURE 8. CROSS-SECTION MAP, A-A'.





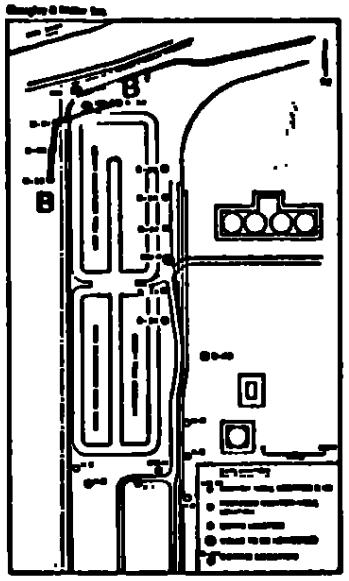


FIGURE 7. CROSS-SECTION MAP, B-B'.

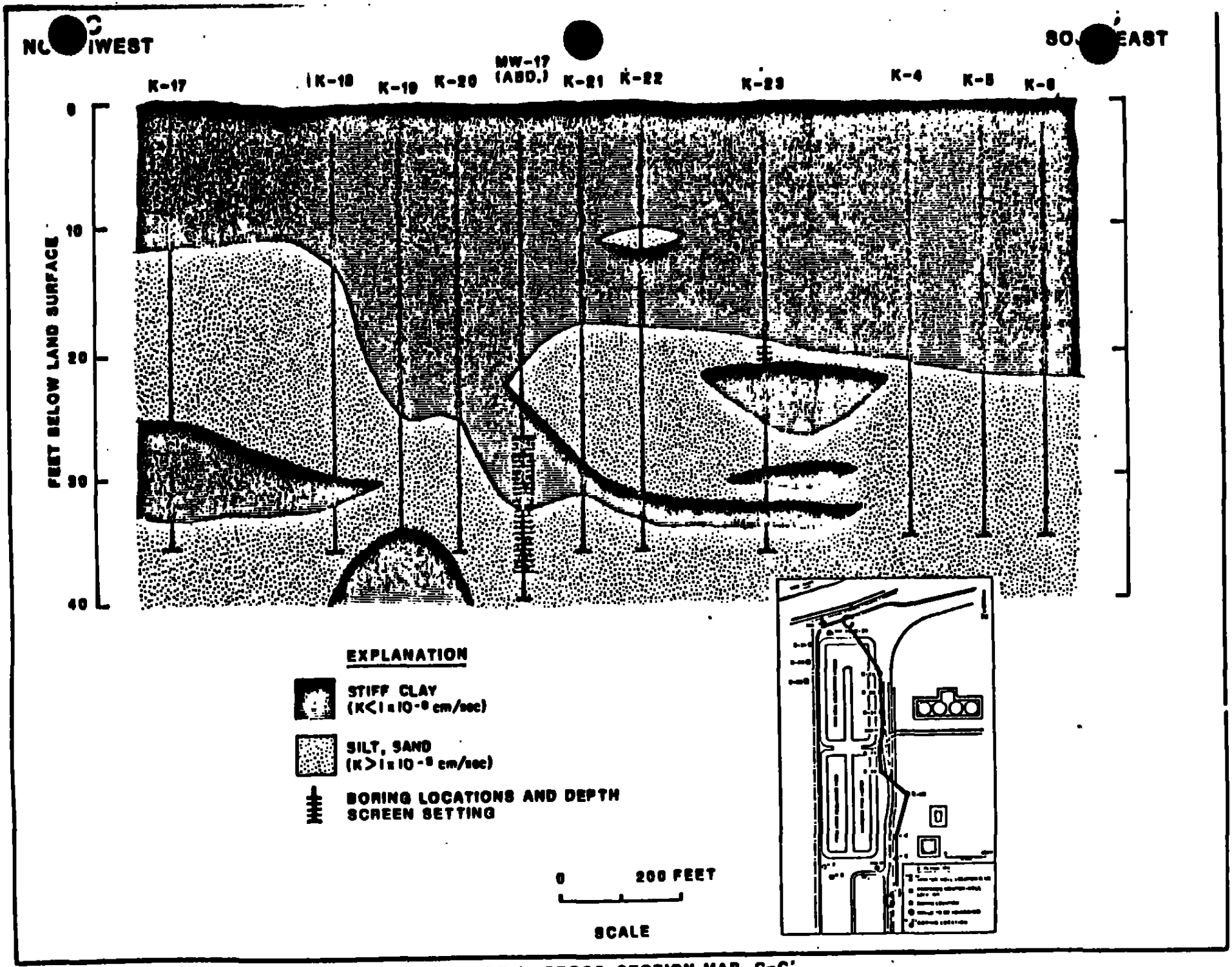


FIGURE 8. CROSS-SECTION MAP, C-C'.

APPENDIX A

Lithologic Logs From Soil Borings
K-1 through K-23

LITHOLOGIC LOG OF SOIL BORING K-1

Description	Depth (ft)	Thickness (ft)
Clay, very stiff, brown-gray	0-5	5
Clay, silty, stiff, brown with ferrous stains	5-8	3
Silt, clayey, soft, gray	8-24	16
Silt, sandy, soft, gray	24-25	1
Silt, clayey, soft, gray	25-38	13
Sand, fine-grained, silty, soft, gray	38-39	1
Silt, clayey, soft, gray	39-42	3
Sand, fine-grained, silty, firm, gray with thin clay layers	42-48	6
Sand, medium-grained, loose, gray	48-65	17
Sand, medium-grained, loose, brown-gray	65-97	32
Clay, very stiff, gray	97-99	2
Sand, fine-grained, loose, gray, with 6-inch clay lens at 114 ft	99-123	24
Clay, very stiff, blue-gray	123-125	2
Total Depth	125 feet	

LITHOLOGIC LOG OF SOIL BORING K-2

Description	Depth (ft)	Thickness (ft)
Clay, very stiff, gray with ferrous stains	0-11	11
Silt, clayey, stiff, gray	11-14	3
Clay, silt, stiff, gray	14-15	1
Silt, clayey, firm, gray	15-24	9
Silt, soft, gray	24-35	11
Total Depth	35 feet	

LITHOLOGIC LOG OF SOIL BORING K-3

Description	Depth (ft)	Thickness (ft)
Clay, very stiff, dark gray with shell fragments	0-4	4
Clay, silty, stiff, gray with ferrous stains	4-12	8
Silt, clayey, stiff, gray	12-14	2
Silt, slightly clayey, firm, gray	14-21	7
Silt, soft, gray	21-35	14
Total Depth	35 feet	

LITHOLOGIC LOG OF SOIL BORING K-4

Description	Depth (ft)	Thickness (ft)
Clay, very stiff, brown-gray with ferrous stains, shell layer at 7 ft	0-9	9
Silt, very clayey, stiff, gray, with ferrous stains	9-11	2
Silt, very stiff, brown, organic rich	11-15	4
Silt, clayey, firm, gray	15-21	6
Silt, soft, gray	21-35	14
Total Depth	35 feet	

LITHOLOGIC LOG OF SOIL BORING K-5

Description	Depth (ft)	Thickness (ft)
Fill material	0-2	2
Clay, very stiff, gray with ferrous stains	2-10	8
Silt, clayey, firm, brown with ferrous stains	10-14	4
Silt, slightly clayey, firm, gray	14-19	5
Silt, clayey, stiff, gray	19-22	3
Silt, soft, gray with thin clay laminations from 28 to 30 ft	22-35	13
Total Depth	35 feet	

LITHOLOGIC LOG OF SOIL BORING K-6

Description	Depth (ft)	Thickness (ft)
Fill material	0-2	2
Clay, very stiff, gray with ferrous stains	2-12	10
Clay, silty, firm, tan with ferrous stains	12-14	2
Silt, clayey, firm, gray	14-16	2
Silt, slightly clayey, firm, gray	16-24	8
Silt, soft, gray	24-35	11
Total Depth	35 feet	

LITHOLOGIC LOG OF SOIL BORING K-7

Description	Depth (ft)	Thickness (ft)
Fill material	0-4	4
Clay, very stiff, gray, with ferrous stains with silt layer at 14 ft	4-17	13
Silt, clayey, stiff, gray, with 3-inch clay lenses	17-25	8
Silt, clayey, soft, gray	25-26	1
Clay, very stiff, gray with silt laminations	26-33	7
Silt, firm, gray	33-35	2
Clay, stiff, gray, with silt lense present	35-47	12
Silt, firm, brown, organic rich	47-51	4
Clay, stiff, gray, with thin silt laminations	51-69	18
Sand, fine grained to silty, soft, gray	69-72	3
Clay, stiff, gray	72-74	2
Sand, fine grained to silty	74-76	2
Clay, silty, stiff, gray with thin sand lenses	76-82	6
Sand, medium-grained, soft, gray with clay layers at 86 ft and 93 ft	82-96	14
Clay, very stiff, blue-gray	96-100	4
Total Depth	100 feet	

LITHOLOGIC LOG OF SOIL BORING K-8

Description	Depth (ft)	Thickness (ft)
Fill material	0-2	2
Clay, very stiff, dark gray	2-13	11
Silt, soft, gray	13-17	4
Clay, stiff, gray, with few silt laminations	17-26	9
Silt, clayey, firm, gray with clay layers at 28 ft and 30 ft	26-33	7
Clay, stiff, gray with silt laminations	33-38	5
Silt, firm, gray	38-41	3
Clay, stiff, gray with silt laminations	41-44	3
Sand, fine-grained, firm, gray	44-45	1
Silt, soft, gray	45-48	3
Silt, firm, gray with organics present	48-51	3
Clay, very stiff, gray with few silt laminations	51-55	4
Total Depth	55 feet	

LITHOLOGIC LOG OF SOIL BORING K-9

Description	Depth (ft)	Thickness (ft)
Fill material	0-2	2
Clay, very stiff, brown	2-8	6
Clay, silty, firm, brown	8-9	1
Clay, very stiff, gray-brown	9-14	5
Clay, slightly silty, firm, gray	14-17	3
Silt, soft, gray with few thin clay laminations	17-25	8
Silt, sandy, firm, gray	25-30	5
Total Depth	30 feet	

LITHOLOGIC LOG OF SOIL BORING K-10

Description	Depth (ft)	Thickness (ft)
Fill material	0-2	2
Clay, very stiff, gray with ferrous stains	2-14	12
Clay, silty, gray, firm	14-18	4
Silt, firm, gray	18-25	7
Silt, sandy, firm, gray	25-31	6
Clay, stiff, gray	31-33	2
Sand, fine to medium-grained, loose, gray	33-40	
Total Depth	40 feet	

LITHOLOGIC LOG OF SOIL BORING K-11

Description	Depth (ft)	Thickness (ft)
Fill material	0-1	1
Clay, very stiff, gray with ferrous stains	1-13	12
Clay, slightly silty, gray, firm	13-21	8
Silt, firm, gray with thin clay laminations	21-23	2
Silt, firm, gray with organics present	23-25	2
Silt, sandy, soft, gray	25-32	7
Clay, stiff, gray	32-34	2
Sand, fine to medium-grained, loose, gray	34-35	1
Total Depth	35 feet	

LITHOLOGIC LOG OF SOIL BORING R-12

Description	Depth (ft)	Thickness (ft)
Fill material	0-1	1
Clay, very stiff, gray with ferrous stains	1-12	11
Silt, clayey, soft, gray	12-19	7
Silt, slightly clayey, soft, gray	19-38	19
Silt, firm, gray	38-43	19
Silt, firm, gray with thin clay laminations	43-50	7
Total Depth	50 feet	

LITHOLOGIC LOG OF SOIL BORING K-13

Description	Depth (ft)	Thickness (ft)
Fill material	0-4	4
Clay, very stiff, gray with ferrous stains	4-11	7
Clay, silty, firm, gray	11-13	2
Silt, slightly clayey, firm, gray	13-20	7
Silt, firm, gray with thin clay laminations	20-28	8
Silt, soft, gray	28-30	2
Clay, firm, gray	30-32	2
Silt, sandy, firm, gray with thin clay lense at 37 ft	32-40	6
Total Depth	40 feet	

Lithologic Description of Soil Boring K-14

Description	Depth (ft.)	Thickness (ft.)
Fill material, topsoil	0-1	1
Silt, slightly clayey, soft, brown, moist, rooted	1-3	2
Clay, silty, firm, brown, rooted, 6" silt layer at 5 foot	3-6	3
Clay, stiff, grey-brown, rooted, ferrous strains	6-10	4
Silt, clayey, soft, saturated, grey-brown	10-11	1
Clay, slightly silty, firm, grey-brown	11-12	1
Silt, soft, grey, saturated rooted, with thin clay laminations from 19-22 feet	12-22	10
Sand, silty, firm, saturated, dark-grey	22-24	2
Silt, soft, grey, saturated with some thin clay laminations present	24-30	6
Clay, firm, grey with thin silty sand layers present	30-36	6
Total Depth	36 feet	

Lithologic Description of Soil Boring K-15 (MW-20)

Description	Depth (ft.)	Thickness (ft.)
Fill material, topsoil, rooted	0-2	2
Clay, very stiff, brown-grey rooted with ferrous strain	2-8	6
Clay, very silty, firm, brown, with ferrous strain	8-12	3
Silt, clayey, soft, grey, with some organics present	12-15	3
Silt, firm, grey with some thin very fine sand layers from 22-29 feet, trace of woody material at 30 feet	15-34	19
Silt with thick clay laminations, stiff grey, with trace of roots	34-37	3
Silt, clayey, firm, grey	37-45	8
Total Depth	45 feet	

Lithologic Description of Soil Boring K-16

Description	Depth (ft.)	Thickness (ft.)
Fill material, topsoil	0-2	2
Clay, very stiff, grey, ferrous stains rooted	2-8	6
Clay, silty, firm, grey-brown, ferrous stains and nodules	8-12	4
Silt, clayey, soft-firm, moist grey, trace of organic material	12-18	6
Clay, silty, soft, grey	18-20	2
Silt, firm, grey, with very fine sand layers present from 24-31 feet	20-31	11
Silt, film, grey with few very fine sand and clay laminations	31-36	5
Silt, firm, grey with 4" clay layers present	36-39	3
Total Depth	39 feet	

Lithologic Description of Soil Boring K-17

Description	Depth (ft.)	Thickness (ft.)
Topsoil, silt clayey firm	0-2	2
Clay, firm-stiff, tan-grey, ferrous stains, rooted	2-9	7
Clay, very silty, soft, brown-grey ferrous stains	9-12	3
Silt, soft, grey, moist, rooted with few silty clay layers present	12-21	9
Sand, very fine, loose, grey, trace of organics	21-22	1
Silt, soft, grey-brown with silty clay laminations	22-25	3
Clay, soft, grey with thin silt laminations	25-30	5
Silt, clayey, soft-firm grey with several 4" very fine sand layers	30-33	3
Clay, firm, grey, trace of organics present	33-34	1
Sand, very fine, compact, grey	34-36	2
Total Depth	36 feet	

Lithologic Description of Soil Boring K-18

Description	Depth (ft.)	Thickness (ft.)
Roadbed, fill material	0-2	2
Clay, silty, stiff, brown-grey ferrous stains, rooted	2-9	7
Silt, clayey, soft, brown-grey saturated, ferrous stains and nodules	9-13	4
Silt, slightly sandy, soft, grey, saturated, rooted	13-18	5
Silt, slightly sand, firm, grey, rooted with thin clay laminations throughout	18-25	7
Sand, very fine, some silt, firm, grey saturated	25-30	5
Clay, firm, grey with thin silt laminations present	30-32	2
Silt, firm, grey, rooted	32-35	3
Sand, silty, firm, grey with clay laminations present	35-36	1
Total Depth	36 feet	

Lithologic Description of Soil Boring K-19

Description	Depth (ft.)	Thickness (ft.)
Roadbed, fill material	0-3	3
Clay, very stiff, grey-brown ferrous stains	3-7	4
Clay, silty, stiff, grey-brown ferrous stains	7-13	6
Clay, stiff, grey with few thin silt layers	13-16	3
Clay, silty, stiff, grey, trace of organics	16-19	3
Silt, clayey, soft moist, grey	19-21	2
Silt, clayey, soft, saturated grey	21-25	4
Silt, slightly sandy, firm, saturated, grey	25-29	4
Silt, firm, grey with thin clay laminations throughout 10" silty sand layer at 30 feet	29-34	5
Clay, stiff, brown-grey, with silt layers present	34-36	2
Total Depth	36 feet	

Lithologic Description of Soil Boring K-20

Description	Depth (ft.)	Thickness (ft.)
Roadbed, fill material	0-1	1
Clay, slightly silty, very stiff, grey ferrous stains	1-9	8
Clay, silty, firm, grey-tan, ferrous stains and nodules	9-15	6
Silt, clayey, firm, grey-brown ferrous stains	15-17	2
Silt, slightly clayey, soft, grey, rooted with trace of wood	17-21	4
Silt, clayey, soft grey	21-25	4
Silt, slightly sandy, firm, grey	25-29	4
Silt, firm, grey with clay laminations and layers	29-36	7
Total Depth	36 feet	

Lithologic Description of Soil Boring K-21

Description	Depth (ft.)	Thickness (ft.)
Roadbed, fill material	0-1	1
Clay, very stiff, brown-grey, ferrous stains, silt zone at 11 feet	1-12	11
Clay, silty, soft, brown-grey ferrous stains	12-14	2
Silt, clayey, soft, grey with ferrous stains and nodules	14-17	3
Silt, sandy, firm, grey	17-18	1
Silt, soft-firm, grey with few clay laminations present	18-20	2
Sand, very fine-silty, compact, grey saturated with thin clay laminations	20-29	9
Clay, silty, firm, grey with thin silt laminations	29-31	2
Silt, sandy, firm, grey with thin clay laminations	31-36	5
Total Depth	36 feet	

Lithologic Description of Soil Boring K-22

Description	Depth (ft.)	Thickness (ft.)
Roadbed, fill material	0-2	2
Clay, very stiff, grey-brown ferrous stains, rooted	2-7	5
Silt, very clayey, firm, grey ferrous stains	7-10	3
Silt, soft, brown, saturated	10-12	2
Silt, slightly clayey, soft, grey	12-17	5
Clay, silty, stiff, grey	17-18	1
Silt, sandy, firm, grey, saturated with a 10-inch clay layer at 20 feet	18-25	7
Silt, firm, grey, with few thin clay laminations throughout, 6 inch clay layer at 29 feet	25-32	7
Clay, slightly silty, firm, grey with very thin silt laminations	32-34	2
Silt, slightly sandy, firm, grey with thin clay laminations	34-36	2
Total Depth	36 feet	

Lithologic Description of Soil Boring K-23 (MW-31)

Description	Depth (ft.)	Thickness (ft.)
Shells, fill material	0-1	1
Clay, very stiff, grey-dark brown ferrous stains, rooted	1-10	9
Clay, slightly silty, soft, grey	10-13	3
Silt, clayey, soft, grey, with ferrous stains	13-18	5
Clay, silty, firm, brown-grey	18-19	1
Sand, very fine-silty, firm, grey saturated	19-21	2
Silt, clayey, firm, grey, rooted	21-26	5
Silt, slightly sandy, firm, grey, with few clay laminations present	26-29	3
Clay, stiff, tan-grey	29-31	2
Sand, silty, firm, grey	31-32	1
Clay, stiff, tan-grey, with thin silt laminations	32-34	2
Silt, sandy, firm, grey	34-36	2
Total Depth	36 feet	

* When well MW-31 was installed on 9/6/85, the location was moved 50 ft north of K-23 and the boring indicated the soil was silt (not clayey silt from 21 to 24 ft).

APPENDIX B

Soil Laboratory Results

Geotechnical Investigation
American Cyanamid Company
Borings for Environmental Evaluation
Fortier, Louisiana

For: Geraghty and Miller, Inc., Ground-Water Consultants, Baton Rouge, Louisiana

SUMMARY OF LABORATORY PERMEABILITY TESTS

BORING K-1

Depth in Feet	Classification	Moisture Content Percent Initial	Moisture Content Percent Final	Density PCF Dry	Density PCF Wet	Coefficient of Permeability cm/sec at 20°C
4.0 - 5.0	No Sample					
38.0 - 39.0	Loose gray sandy silt w/clay lenses	28.0	30.6	92.7	118.7	8.7×10^{-5} (H)
44.0 - 45.0	Clay w/sand layers	Disturbed				
47.0 - 48.0	Loose gray sandy silt w/clay layers	28.6	33.6	86.7	111.4	4.7×10^{-6} (H)
80.0	Silty sand (Jar Sample)					
123.0 - 125.0	Very stiff gray & tan sandy clay	17.6	20.4	114.6	134.8	1.0×10^{-10} (V)

BORING K-4

17.0 - 18.0	Soft gray clay w/sandy silt lenses	40.9	44.3	77.9	109.8	2.8×10^{-5} (H)

(V) - Vertical
(H) - Horizontal

Soil Mechanics Laboratory Tests
American Cyanamid Company
Soil Borings and Well Installations
Fortier, Louisiana

For: Geraghty & Miller, Inc., Ground-Water Consultants, Baton Rouge, Louisiana

SUMMARY OF LABORATORY PERMEABILITY TESTS

BORING 2 (K-15)

Depth In Feet	Classification	Moisture Content Percent Initial	Moisture Content Percent Final	Density PCF Dry	Density PCF Wet	Coefficient of Permeability cm/sec at 20°C
17.0 - 18.0	Very soft gray silty clay w/sandy silt layers	33.6	34.6	85.5	114.3	1.1×10^{-6} (H)

(H) - Permeability Test performed in a horizontal direction.

Geotechnical Investigation
American Cyanamid Company
Borings for Environmental Evaluation
Fortier, Louisiana

For: Geraghty and Miller, Inc., Ground-Water Consultants, Baton Rouge, Louisiana

SUMMARY OF LABORATORY PERMEABILITY TESTS

BORING K-10

Depth in Feet	Classification	Moisture Content Percent Initial	Moisture Content Percent Final	Density PCF Dry	Density PCF Wet	Coefficient of Permeability cm/sec at 20°C
23.0 - 25.0	Sample disturbed (Poorly sealed)					

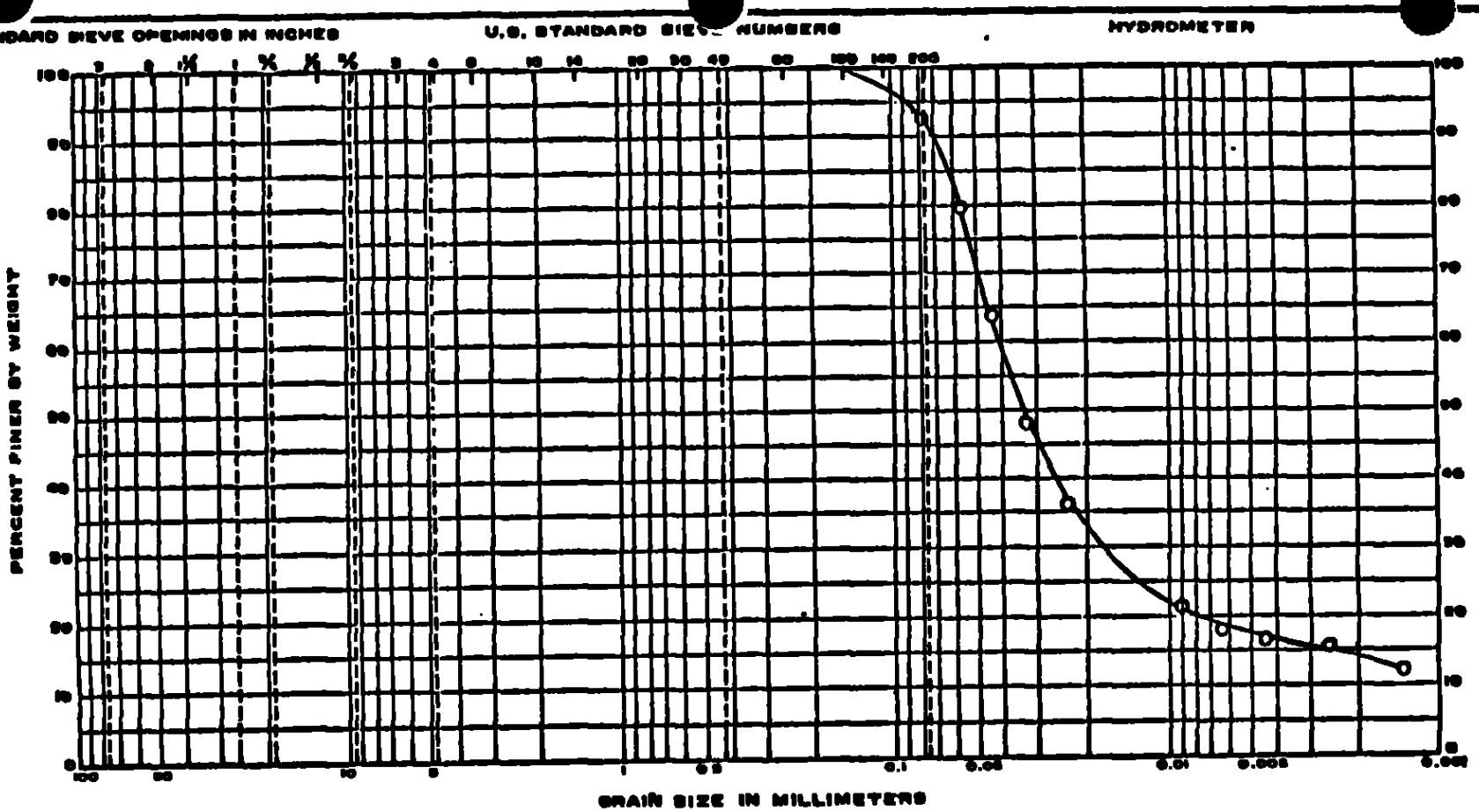
BORING K-11

10.0 - 11.0	No Sample					

BORING K-13

18.0 - 19.0	Loose gray clayey silt w/sandy silt layers & lenses	26.0	29.6	92.6	116.6	9.9×10^{-6} (H)

(V) - Vertical
(H) - Horizontal



UNIFIED	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	COARSE	MEDIUM	FINE		
AASHO	GRAVEL			SAND		SILT	CLAY
	COARSE	MEDIUM	FINE	COARSE	FINE		

GRAIN SIZE ANALYSIS

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH IN FT.	NATURAL WATER CONTENT	ATTERBERG LIMITS		
					LL	PL	PI
	K-1		38'-39'				

PROJECT: Geotechnical Investigation
American Cyanamid Company
Borings for Environmental Evaluation
Fortier, Louisiana
For: Geraghty and Miller, Inc.,
Ground-Water Consultants, Baton Rouge, Louisiana

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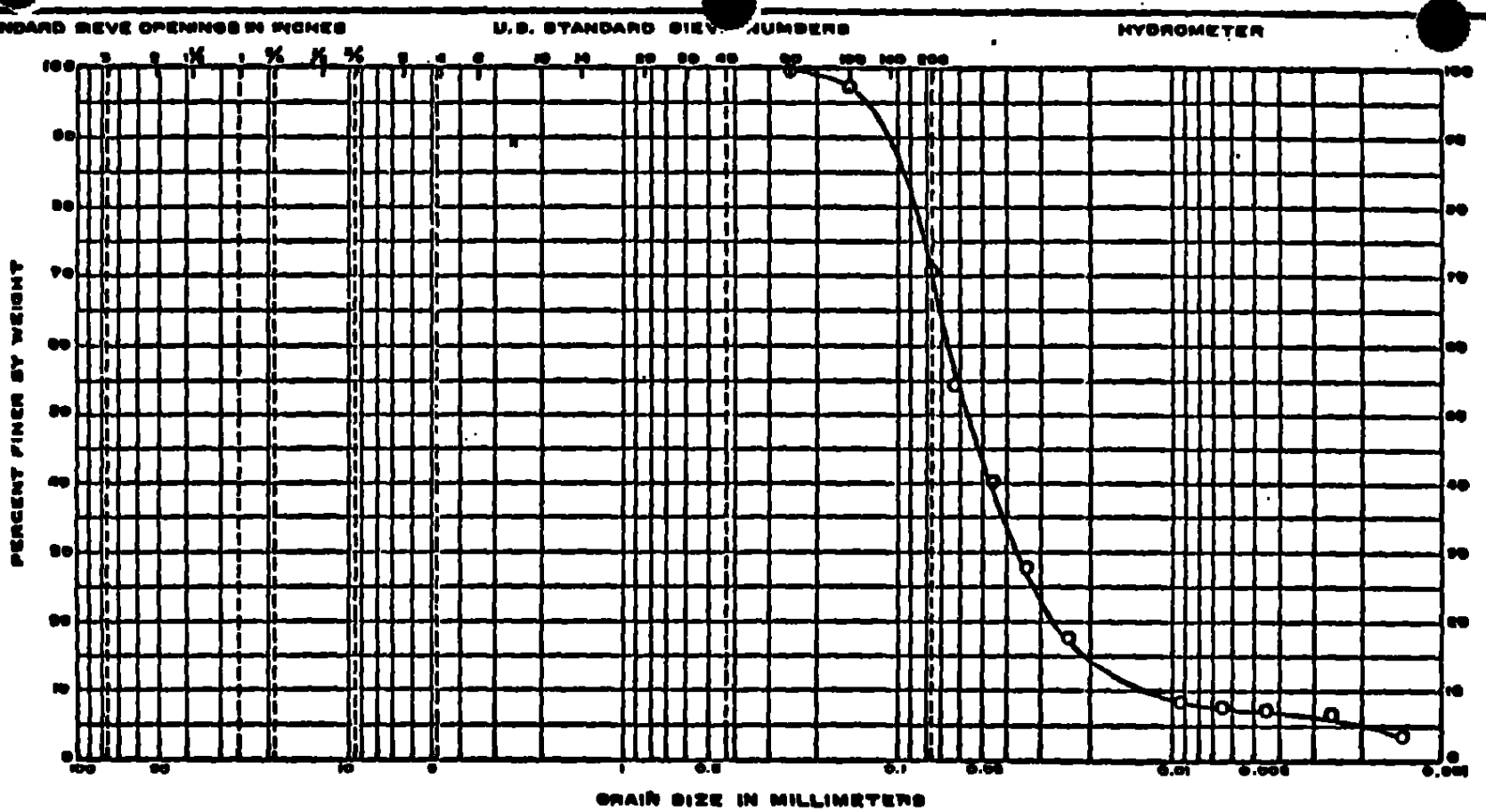
CONSULTING FOUNDATION ENGINEERS
METAIRIE, LA.



UNIFIED	GRAVEL			SAND			SILT OR CLAY	
	COARSE	FINE		COARSE	MEDIUM	FINE		
AASHO	GRAVEL			SAND			SILT	CLAY
	COARSE	MEDIUM	FINE	COARSE		FINE		

GRAIN SIZE ANALYSIS

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH IN FT.	NATURAL WATER CONTENT	ATTERBERG LIMITS		
					LL	PL	PI
	K-1	47'-48'					

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American Cyanamid Company
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Fortier, Louisiana
For: Geraghty and Miller, Inc.,
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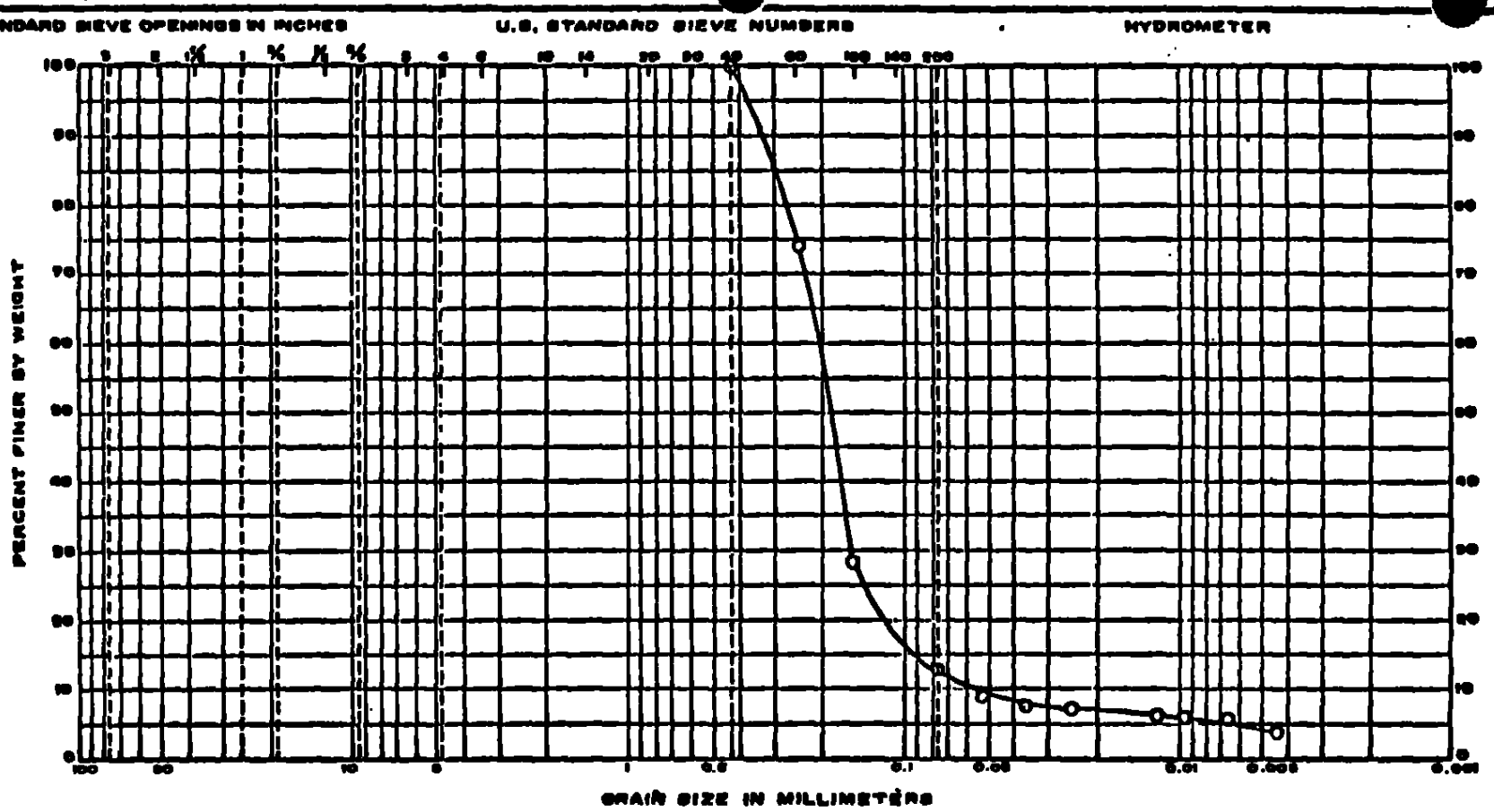

UNIFIED	GRAVEL			SAND			SILT OR CLAY		
	COARSE	FINE		COARSE	MEDIUM	FINE			
AASHO	GRAVEL			SAND			SILT	CLAY	
	COARSE	MEDIUM	FINE	COARSE		FINE			

GRAIN SIZE ANALYSIS

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH IN FT.	NATURAL WATER CONTENT	ATTERBERG LIMITS		
					LL	PL	PI
	K-1	80'-85'					

PROJECT: Geotechnical Investigation
American Cyanamid Company
Borings for Environmental Evaluation
Fortier, Louisiana
For: Geraghty and Miller, Inc.,
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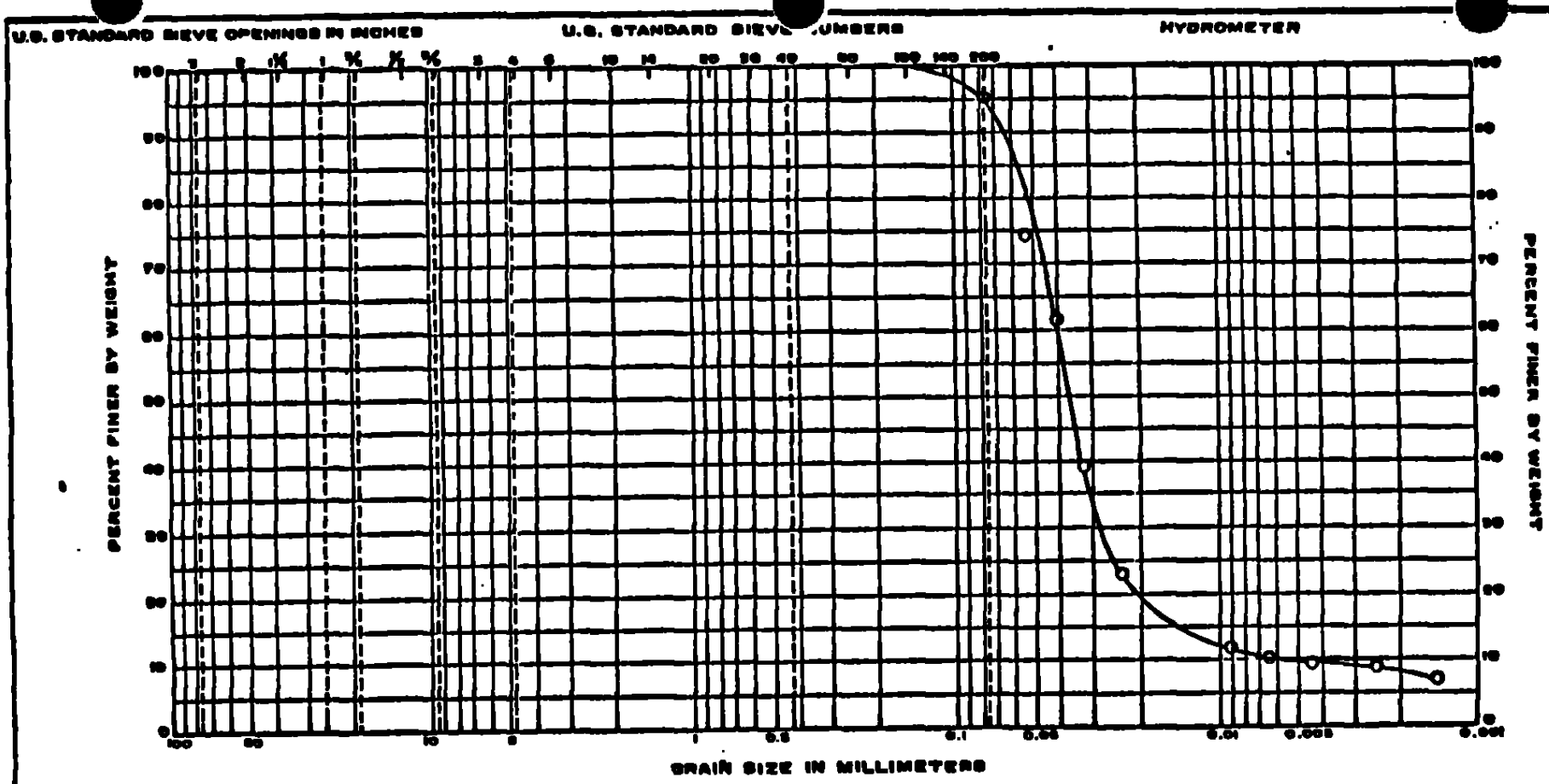
METAIRIE, LA.



UNIFIED	GRAVEL			SAND			SILT OR CLAY	
	COARSE	FINE		COARSE	MEDIUM	FINE		
AASHO	GRAVEL			SAND			SILT	CLAY
	COARSE	MEDIUM	FINE	COARSE	FINE			

GRAIN SIZE ANALYSIS

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH IN FT.	NATURAL WATER CONTENT	ATTERBERG LIMITS		
					LL	PL	PI
		K-4	17'-20'				

PROJECT: Geotechnical Investigation
American Cyanamid Company
Borings for Environmental Evaluation
Fortier, Louisiana
For: Geraghty and Miller, Inc.,
Ground-Water Consultants, Baton Rouge, Louisiana

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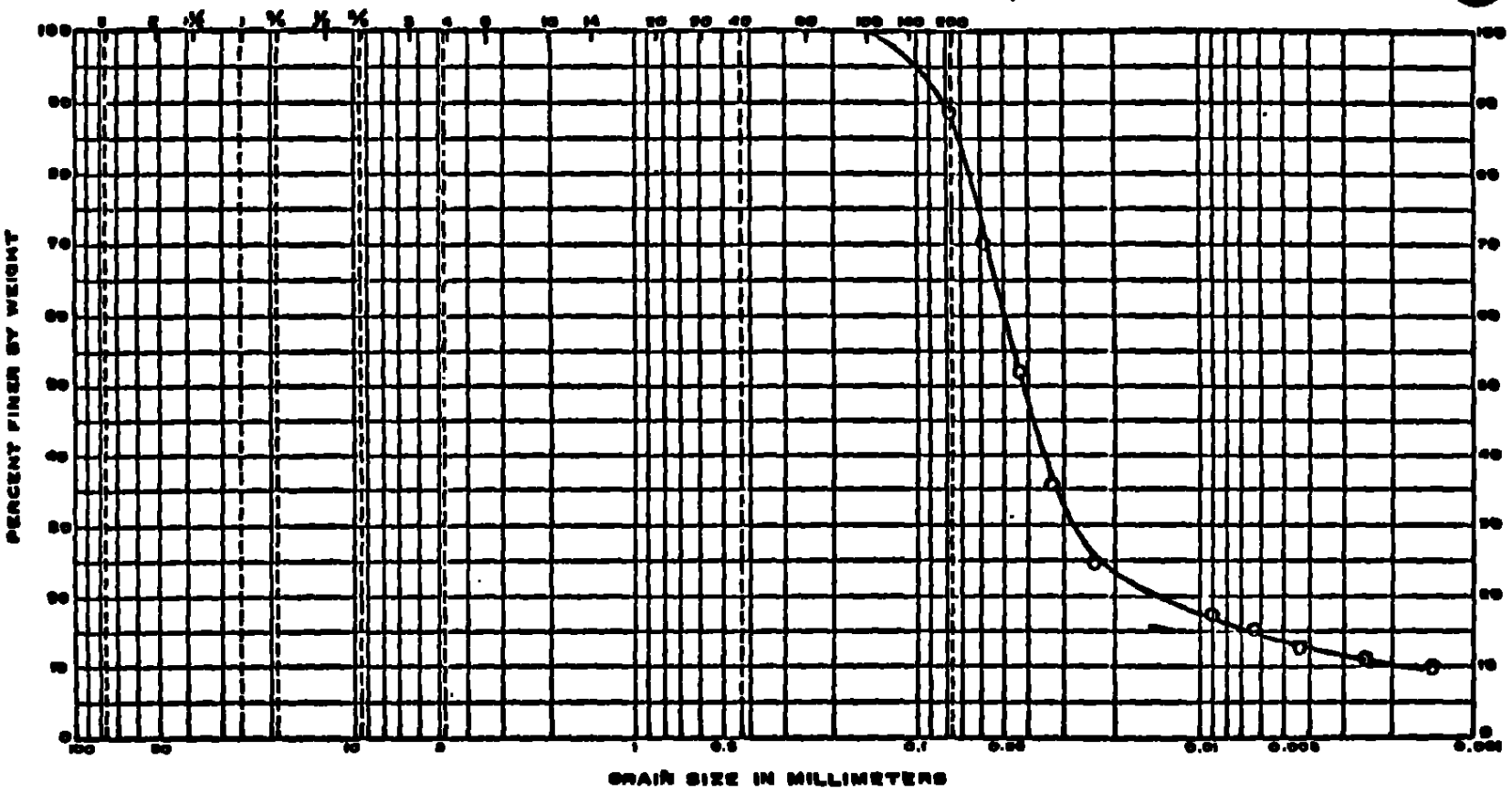
CONSULTING FOUNDATION ENGINEERS
METAIRIE, LA.



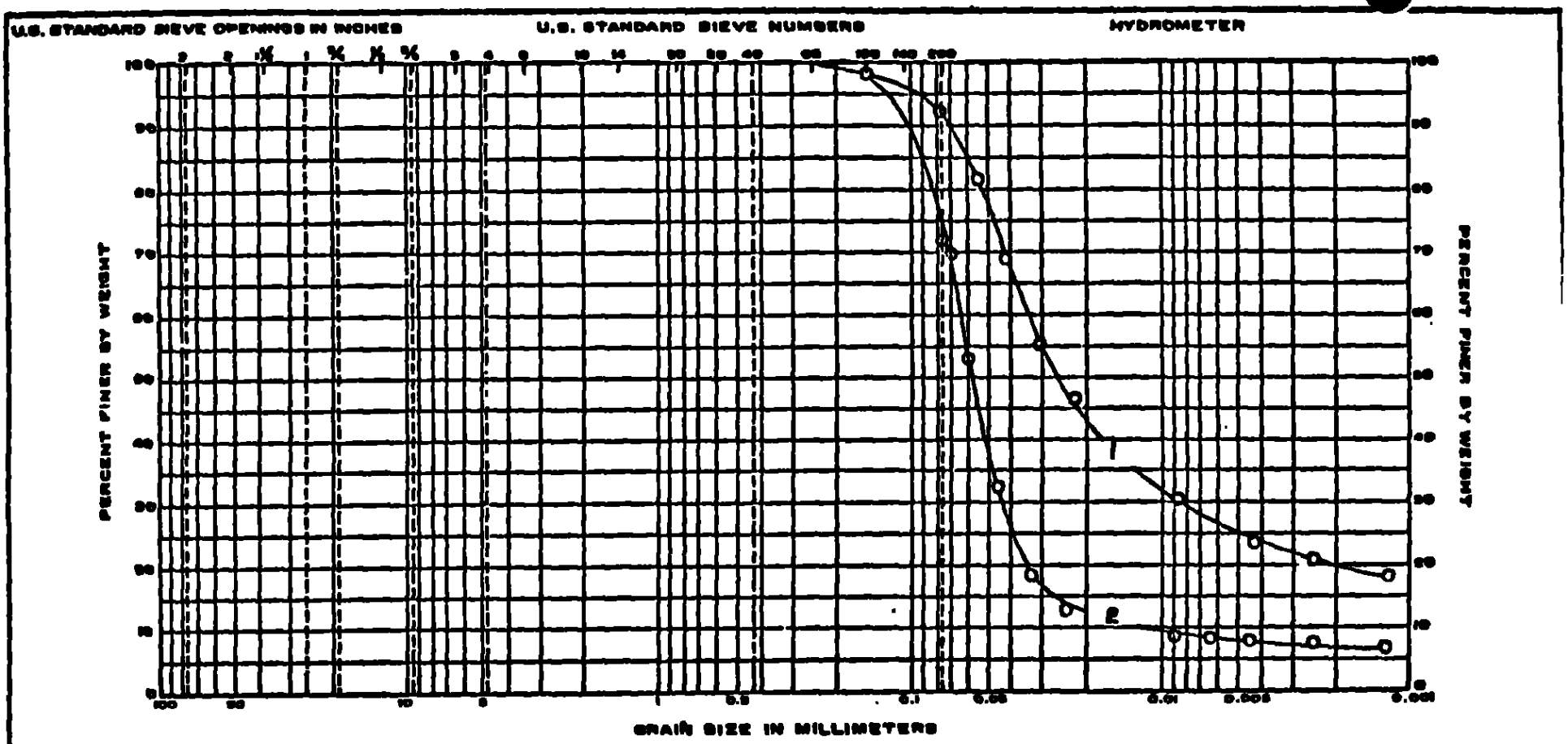
UNIFIED	GRAVEL			SAND			SILT OR CLAY	
	COARSE	FINE		COARSE	MEDIUM	FINE		
AASHO	GRAVEL			SAND			SILT	CLAY
	COARSE	MEDIUM	FINE	COARSE		FINE		

GRAIN SIZE ANALYSIS

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH IN FT.	NATURAL WATER CONTENT	ATTERBERG LIMITS		
					LL	PL	PI
	K-13		18'-19'				

PROJECT: Geotechnical Investigation
American Cyanamid Company
Borings for Environmental Evaluation
Fortier, Louisiana
For: Geraghty and Miller, Inc.,
Ground-Water Consultants, Baton Rouge, Louisiana

EUSTIS ENGINEERING COMPANY
CONSULTING FOUNDATION ENGINEERS
METAIRIE, LA.



UNIFIED	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	COARSE	MEDIUM	FINE		
AASHO	GRAVEL			SAND		SILT	CLAY
	COARSE	MEDIUM	FINE	COARSE	FINE		

GRAIN SIZE ANALYSIS

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH IN FT.	NATURAL WATER CONTENT	ATTERBERG LIMITS LL	PL	PI
1	MW-20	K-14	15-20				
2	MW-31	K-23	19-24				

PROJECT Soil Mechanics Laboratory Tests
American Cyanamid Company
Soil Borings and Well Installations
Fortier, Louisiana
For: Geraghty & Miller, Inc., Baton Rouge, La.

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APPENDIX C

Monitor-Well Abandonment

Monitor-Well Abandonment Information

From the review of monitor-well locations, visual inspections, well-construction details and the ground-water quality results taken from the well integrity tests, a determination was made on a well-by-well basis as to whether it should be abandoned. As a result of the tests performed, thirteen (13) monitor wells (MW-1, -2, -3, -5, -6, -8, -9, -10, -15, -16, -17, -18, and -19) were found to have poor integrity and with the approval of DEQ, were subsequently abandoned. The summarized well integrity test results are as follows:

Well MW-1: Logging assessment technique shows poor cement to casing bonding; DEQ has recommended abandonment (G&M did not test).

Well MW-2: Well screen is placed in a silty clay; grout around casing is cracked and is a potential conduit for vertical migration; recommend abandonment.

Well MW-3: Screened in silty clay; water samples have a great variation in conductivity (1560 to 1750 umhos/cm); recommend abandonment.

Well MW-4: Good well, but no potential future use foreseen; retain as piezometer.

Well MW-5: Effective sampling interval too great (17 ft to 60 ft) according to DEQ; recommend abandonment.

Well MW-6: Very silty water samples; screened in silty clay; too close (on dike) to facility; recommend abandonment.

Well MW-7: Good well, but according to DEQ guidelines, it is not usable as a monitor well because it is greater than 200 ft from facility; retain as piezometer.

Well MW-8: Logging assessment technique shows poor cement to casing bonding; DEQ has recommended abandonment (G&M did not test).

Well MW-9: Very silty water samples; large pH and conductivity variations; recommend abandonment.

Well MW-10: Screened in silty clay; very turbid samples; large conductivity variations; very slow recharge rate; recommend abandonment.

Well MW-11 and MW-12: Solid waste wells, therefore they are not part of this assessment but tested to be good; no recommendation.

Well MW-13: Previously abandoned.

Well MW-14: Produced clear representative water samples; retain for monitoring.

Well MW-15: Slightly cloudly; conductivity changes; recommend abandonment.

Well MW-16: Slightly cloudly; slight pH and conductivity variations; recommend abandonment.

Well MW-17: Very silty; very slow recharge rate; screened in silty clay; recommend abandonment.

Well MW-18: Casing and concrete broken in wells; poor grout seal observed; screened in silty clay zone; not tested; recommend abandonment.

Well MW-19: Improper screen interval, samples cloudy; recommend abandonment.

The details of the well abandonment program are summarized in Table C-1.

The monitor-well abandonment procedure consisted of the following three steps: 1) remove well casing and screen; 2) ream the borehole to remove debris (grout, gravel pack, etc.); 3) grout the borehole with a Class A Portland cement/bentonite grout from bottom to top using the tremie method. A location map of the abandoned monitor wells is provided as Figure C-1.

Monitor-Well and Abandonment Information Details
American Cyanamid Company
Westwego, Louisiana

Well Number	Well Casing & Screen (ft)	Well Casing & Screen Removed (ft)	Reamed Hole to 7-1/4" Diameter	Bags of Cement Used	Bags of Bentonite Clay Used	Filled in Subsidence After 48 hrs.	Date of Abandonment
MW-1	78.6	17.0(2)	YES	5.0	0.5	YES(1)	6-85
MW-2	28.7	28.7	YES	5.0	0.5	YES(1)	6-85
MW-3	28.2	28.2	YES	5.0	0.5	YES	7-85
MW-5	29.2	10.0(2)	YES	5.0	0.5	YES	8-85
MW-6	28.0	28.0	YES	5.0	0.5	YES	7-85
MW-8	38.0	28.0(2)	YES	6.0	0.5	YES(1)	7-85
MW-9	28.0	28.0	YES	5.0	0.5	YES	7-85
MW-10	28.2	28.2	YES	5.0	0.5	YES	7-85
MW-15	29.6	29.6	YES	5.0	0.5	YES	8-85
MW-16	30.0	30.0	YES	5.0	0.5	YES	7-85
MW-17	30.0	30.0	YES	5.0	0.5	YES	8-85
MW-18	36.0	36.0	YES	6.0	0.5	YES	7-85
MW-19	40.7	40.7	YES	6.0	0.5	YES	6-85

(1) Upper three feet filled with native soils (clay).
(2) Remaining casing internally grouted in place.

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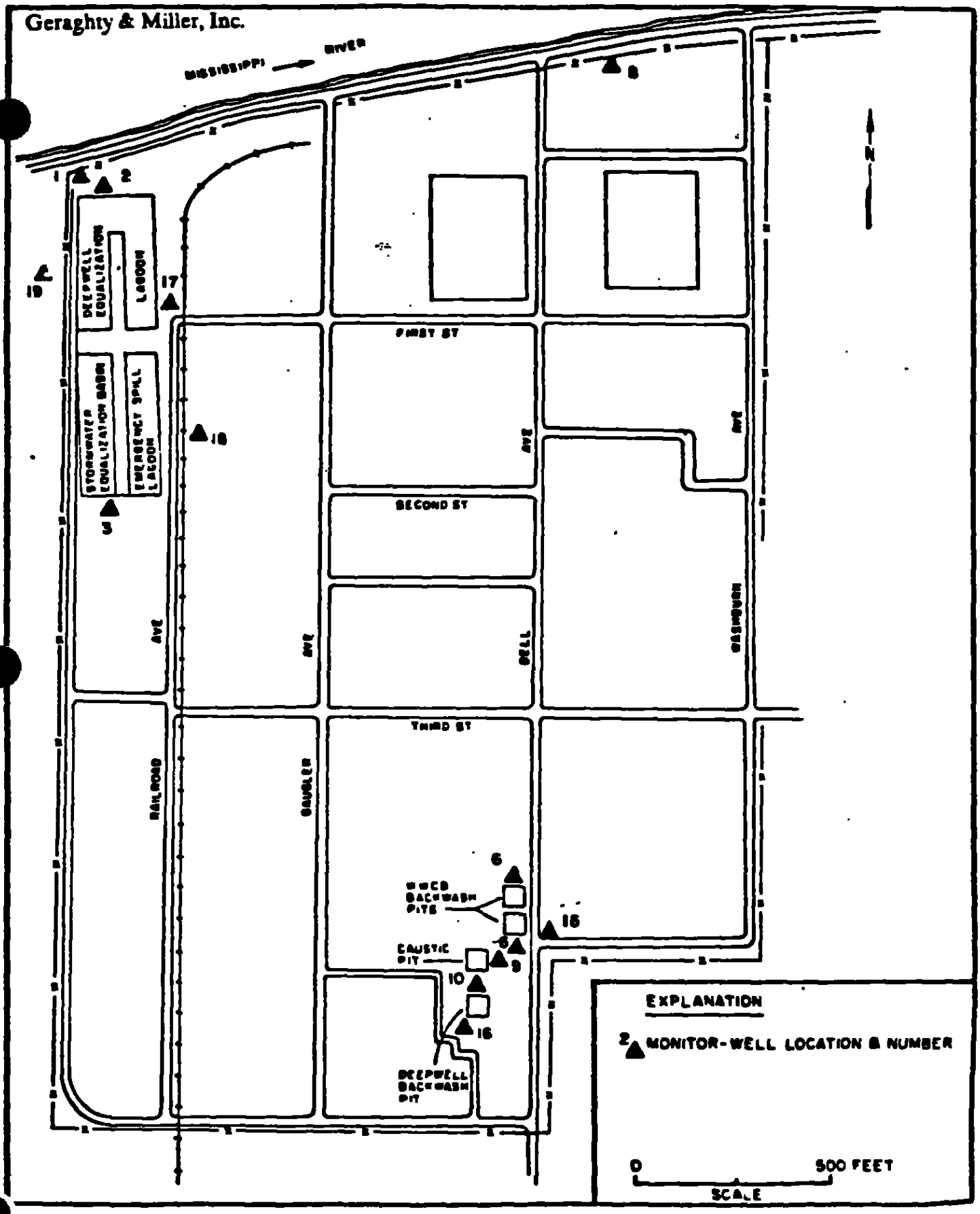


FIGURE C-1 LOCATIONS OF ABANDONED MONITOR WELLS.

APPENDIX D

Monitor-Well Installation

Monitor-Well Installation

The monitor wells were installed using a mud-rotary drilling rig. Using information obtained from the soil boring program, an 8-inch diameter borehole was drilled to the top of the proposed interval to be screened. Undisturbed soil samples were then taken of this zone to confirm its suitability as a screen interval.

The monitor wells were then installed into the borehole. The wells were constructed of 3-inch diameter, schedule 40, flush threaded PVC casing with a 3-inch diameter, 5-foot, long, 10-slot (0.01-inch) PVC screen. A 2.5-foot long capped sump and stainless-steel centralizer were attached to the bottom of each screen section. A gravel pack consisting of 20/40 filter sand was placed by the tremie method in the annular space around the well screen from the bottom of the well bore to two feet above the top of the well screen. One foot of fine sugar sand was then placed above the gravel pack in the annular space by the tremie method to prevent seepage of the grout into the gravel pack. Finally, a sulfate resistant, Class H cement grout/bentonite mixture was placed in the annular space from the top of the sugar sand to land surface to eliminate seepage of surface contaminants into the screened zone. Individual monitor-well construction diagrams are provided as Figures D-1 through D-12.

After allowing a minimum of twenty-four hours for the cement to set, each well was developed by a combination of swabbing and air-lifting until sediment free formation water was pumped from the wells, thereby ensuring that all drilling fluids had been removed and sediment-free samples would be obtained. After development, each well was provided with a "Well-Wizard" ground-water sampling pump.

Lockable, protective steel casings were then placed over the well casings and installed in 3 foot square concrete pads. Steel protective barriers were placed around each well to provide protection from vehicular traffic. Upon completion of the monitor-wells, the well casings were surveyed relative to mean sea level (msl). This data along with well- construction details are provided in Table D-1.

Geraghty & Miller, Inc.

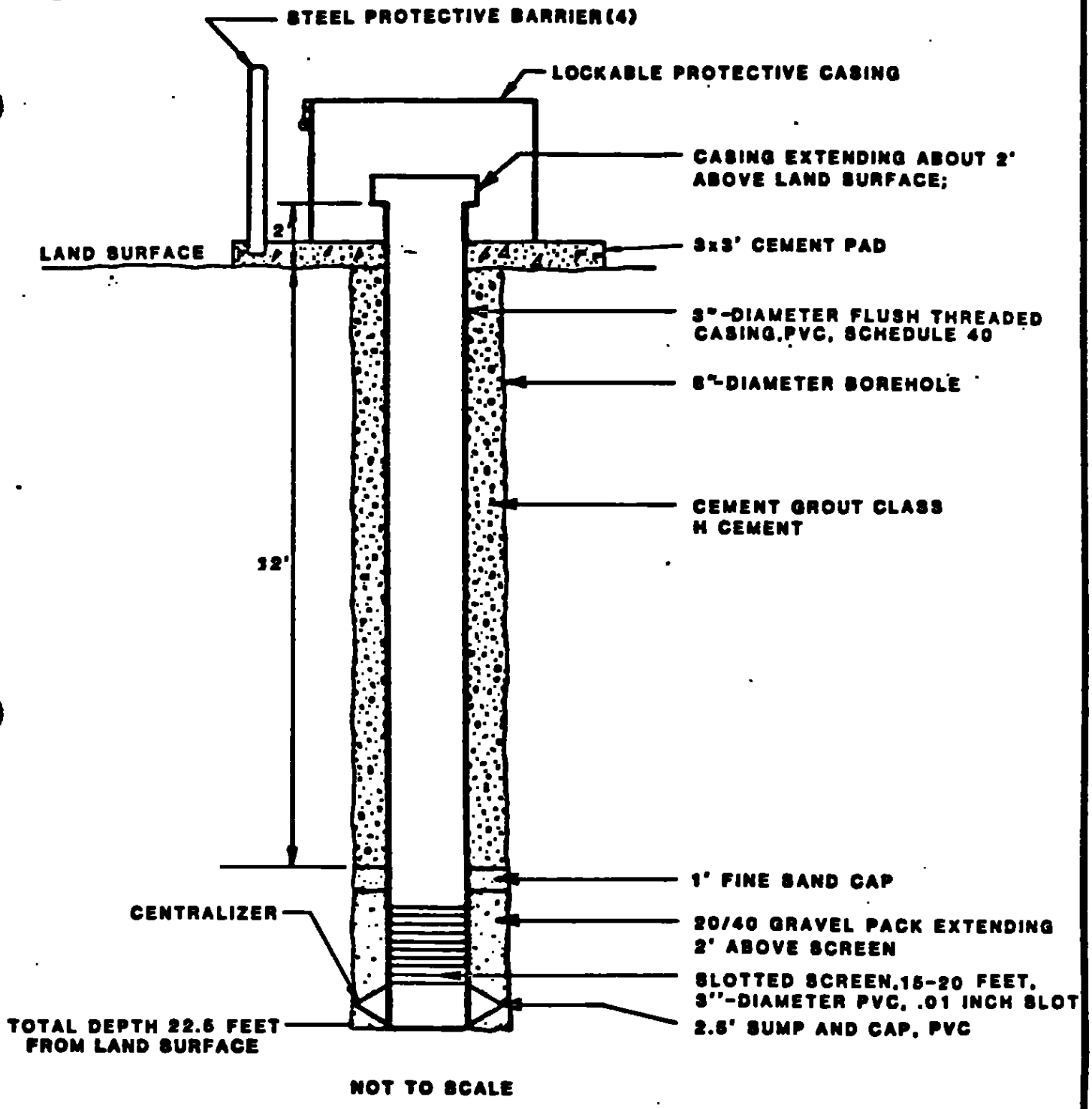


FIGURE D-1.

CONSTRUCTION DIAGRAM OF MW-20

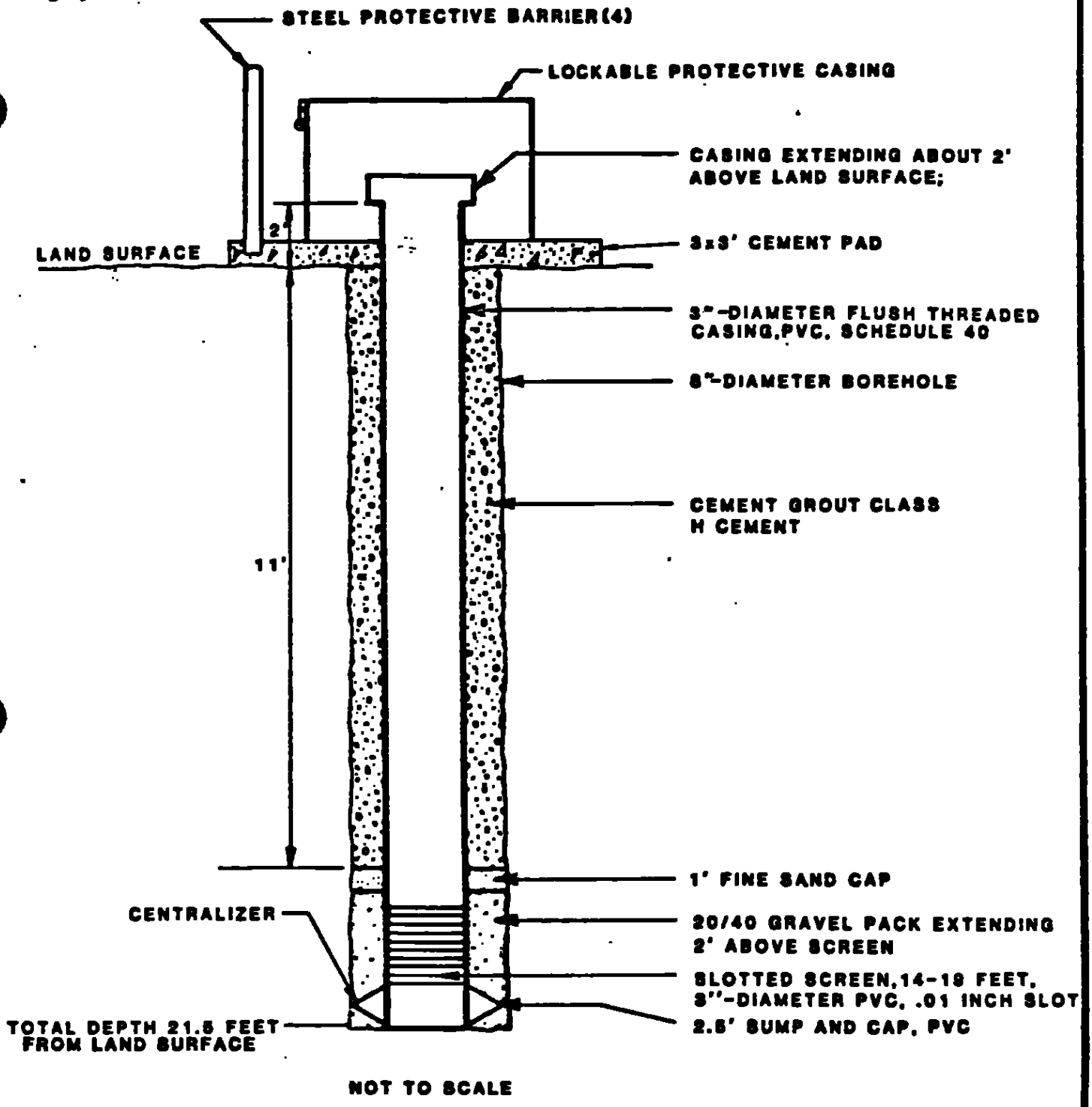
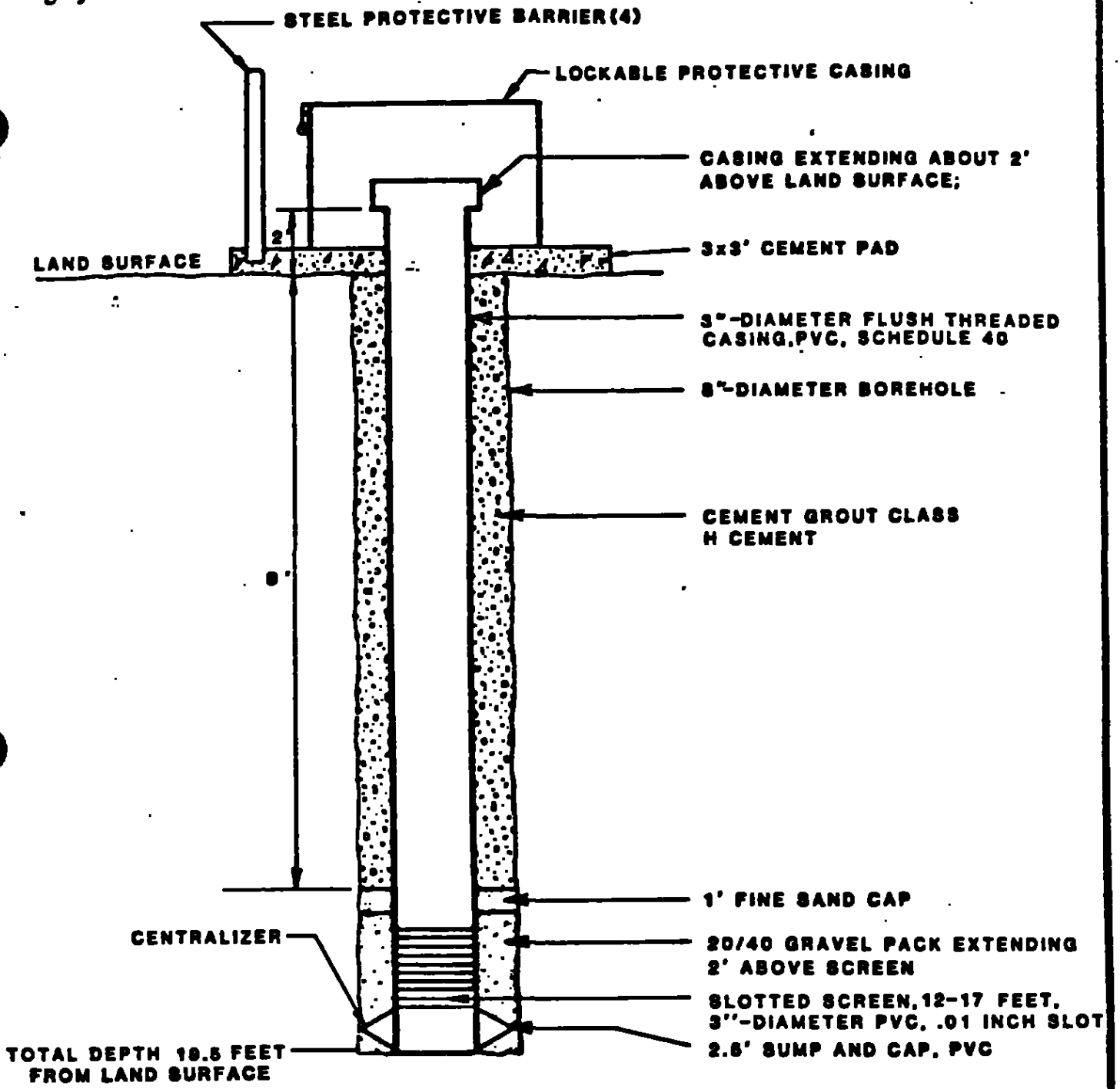


FIGURE D-2.

CONSTRUCTION DIAGRAM OF MW-21



NOT TO SCALE

FIGURE D-3.

CONSTRUCTION DIAGRAM OF MW-22

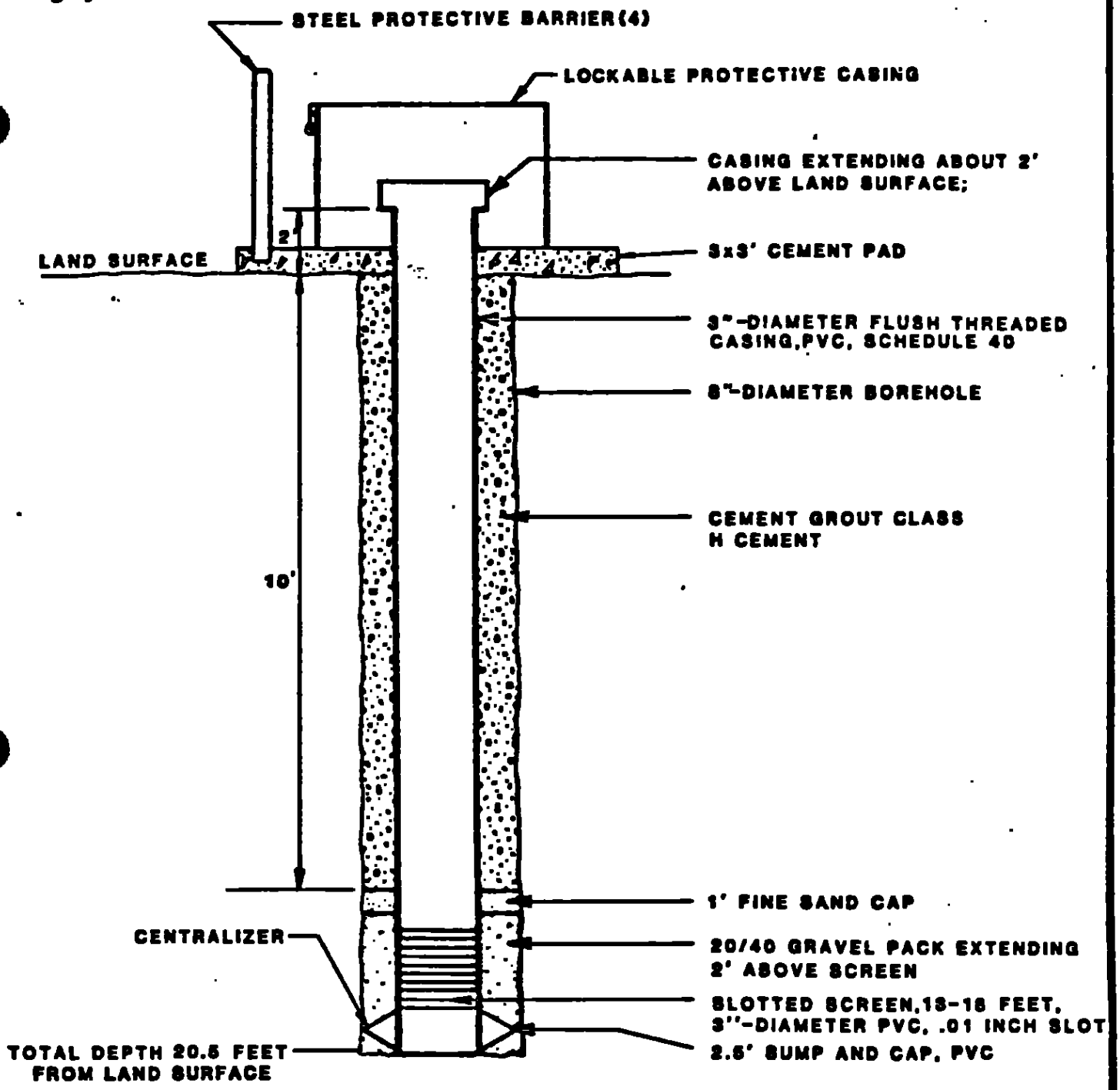


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FIGURE D-4.

CONSTRUCTION DIAGRAM OF MW-23

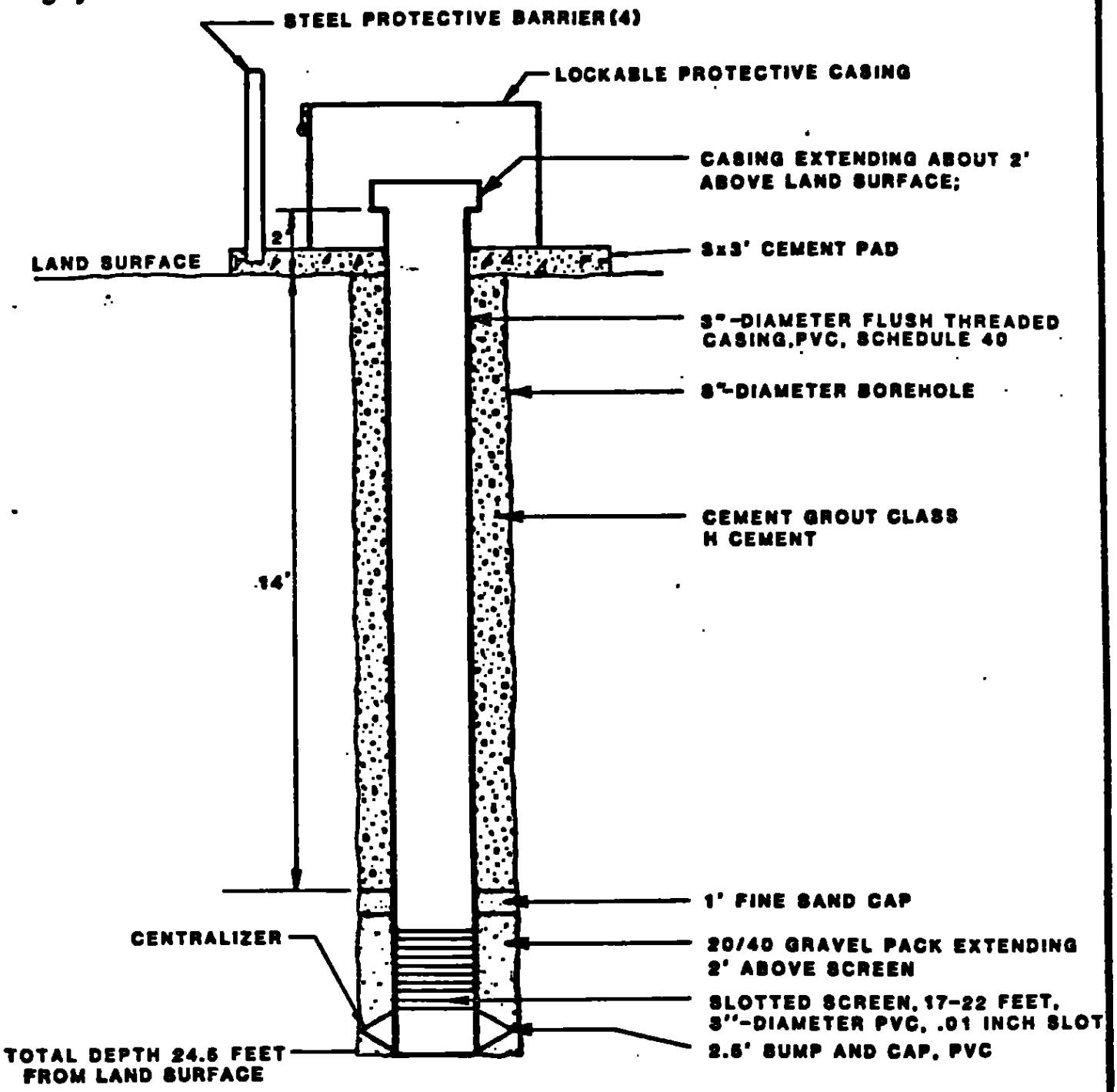

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FIGURE D-5.

CONSTRUCTION DIAGRAM OF MW-24

Geraghty & Miller, Inc.

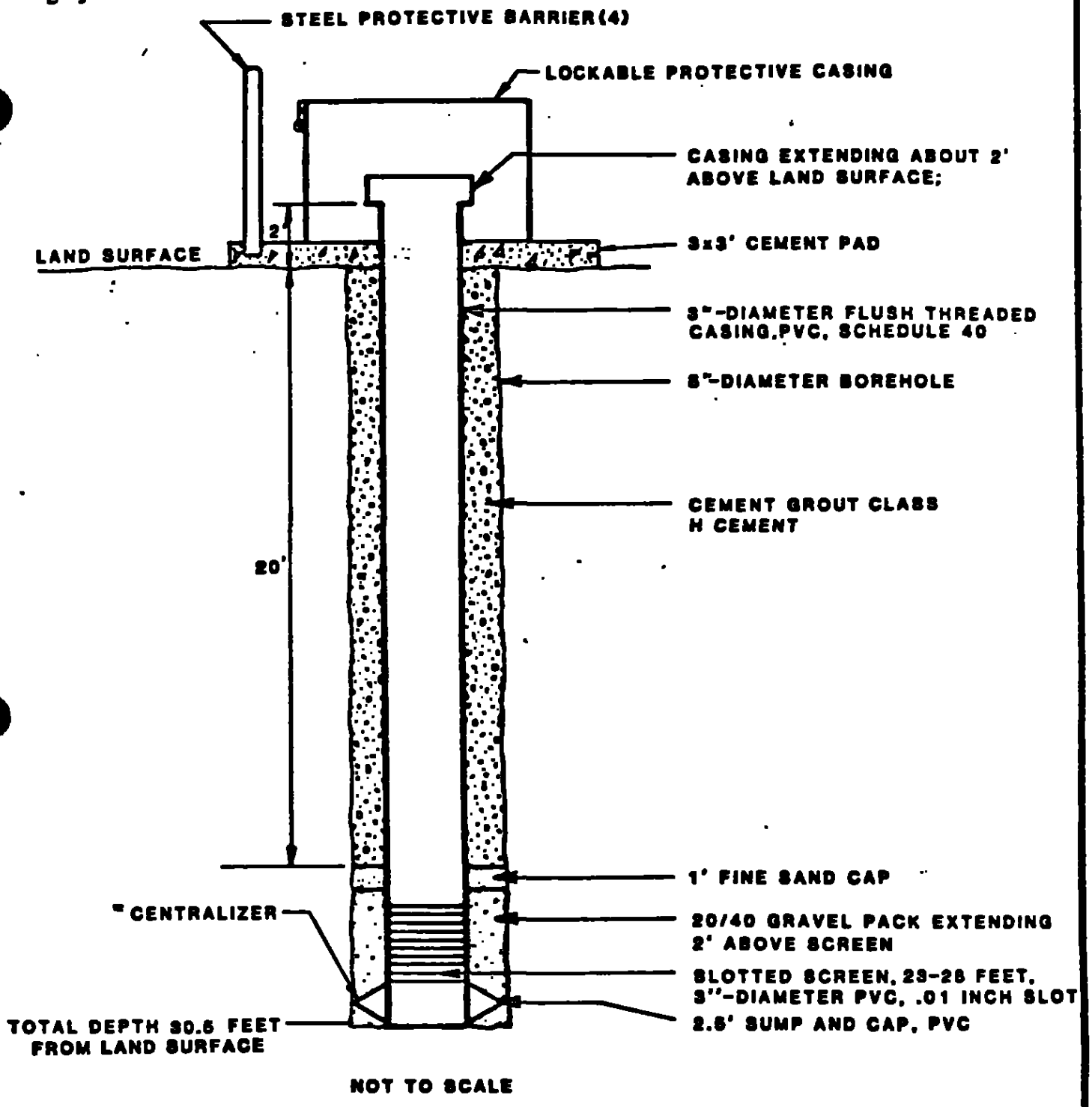

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FIGURE D-6.

CONSTRUCTION DIAGRAM OF MW-25

Geraghty & Miller, Inc.

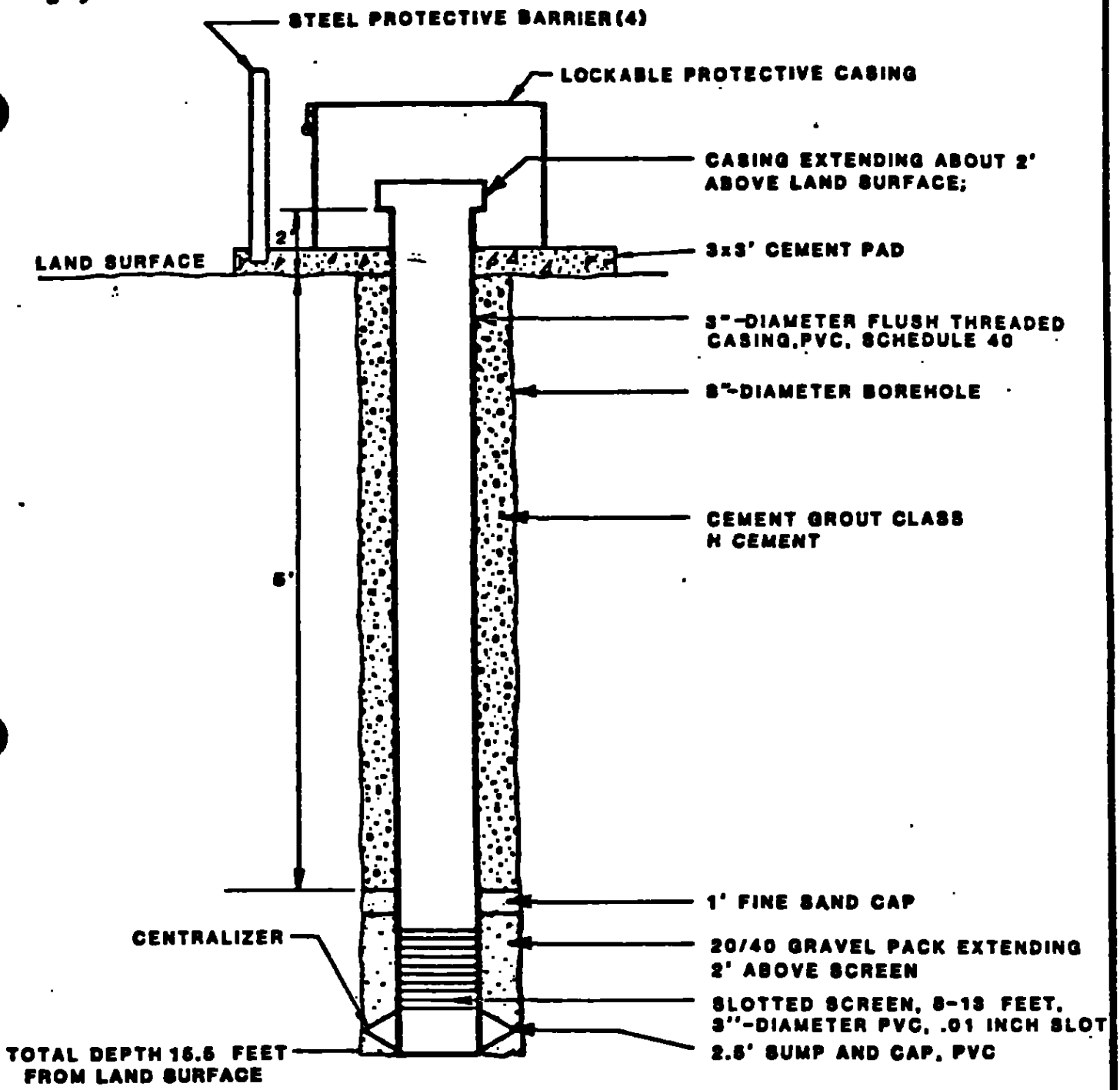

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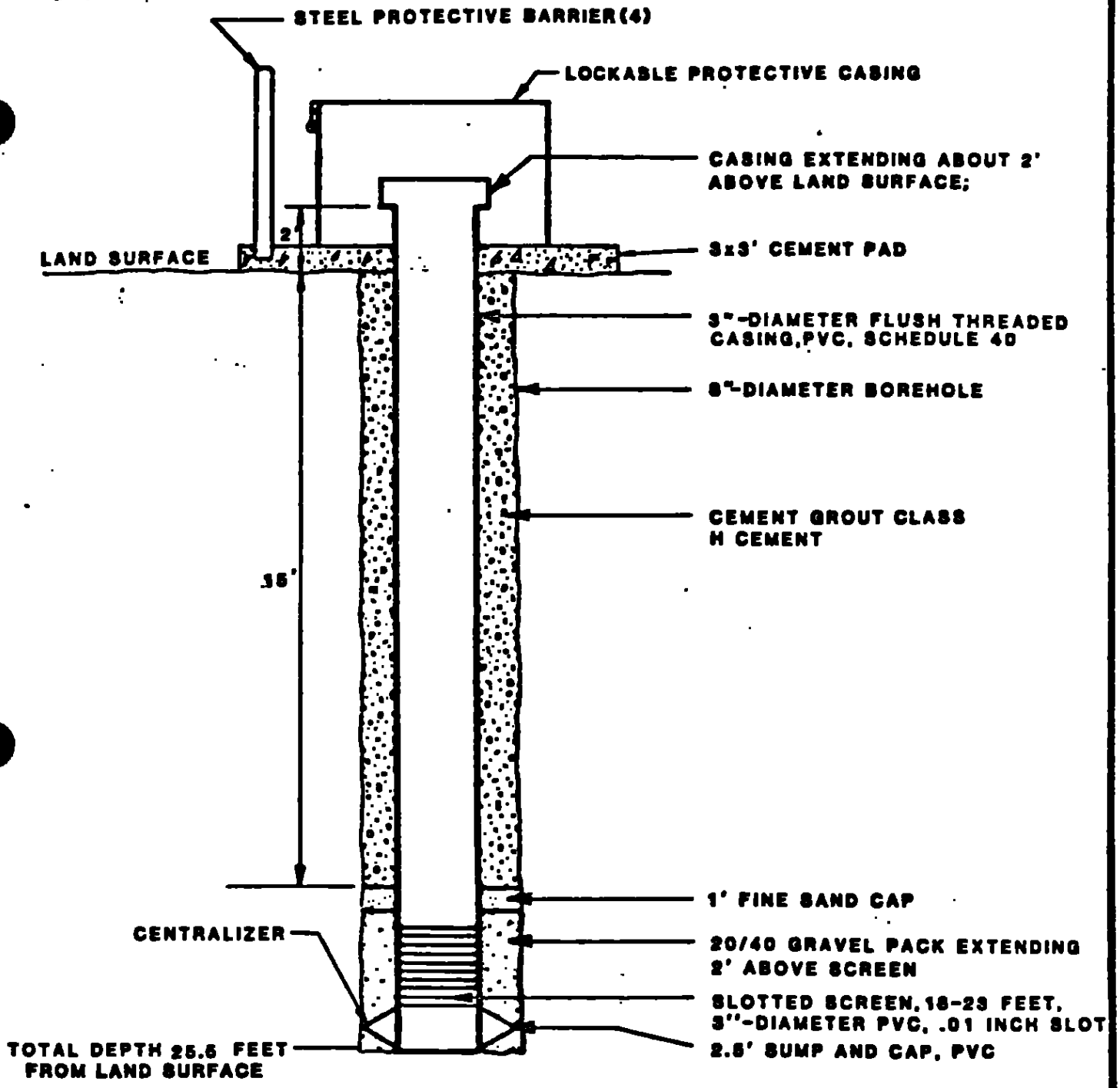
FIGURE D-7.

CONSTRUCTION DIAGRAM OF MW-26



NOT TO SCALE

FIGURE D-8.

CONSTRUCTION DIAGRAM OF MW-27

Geraghty & Miller, Inc.

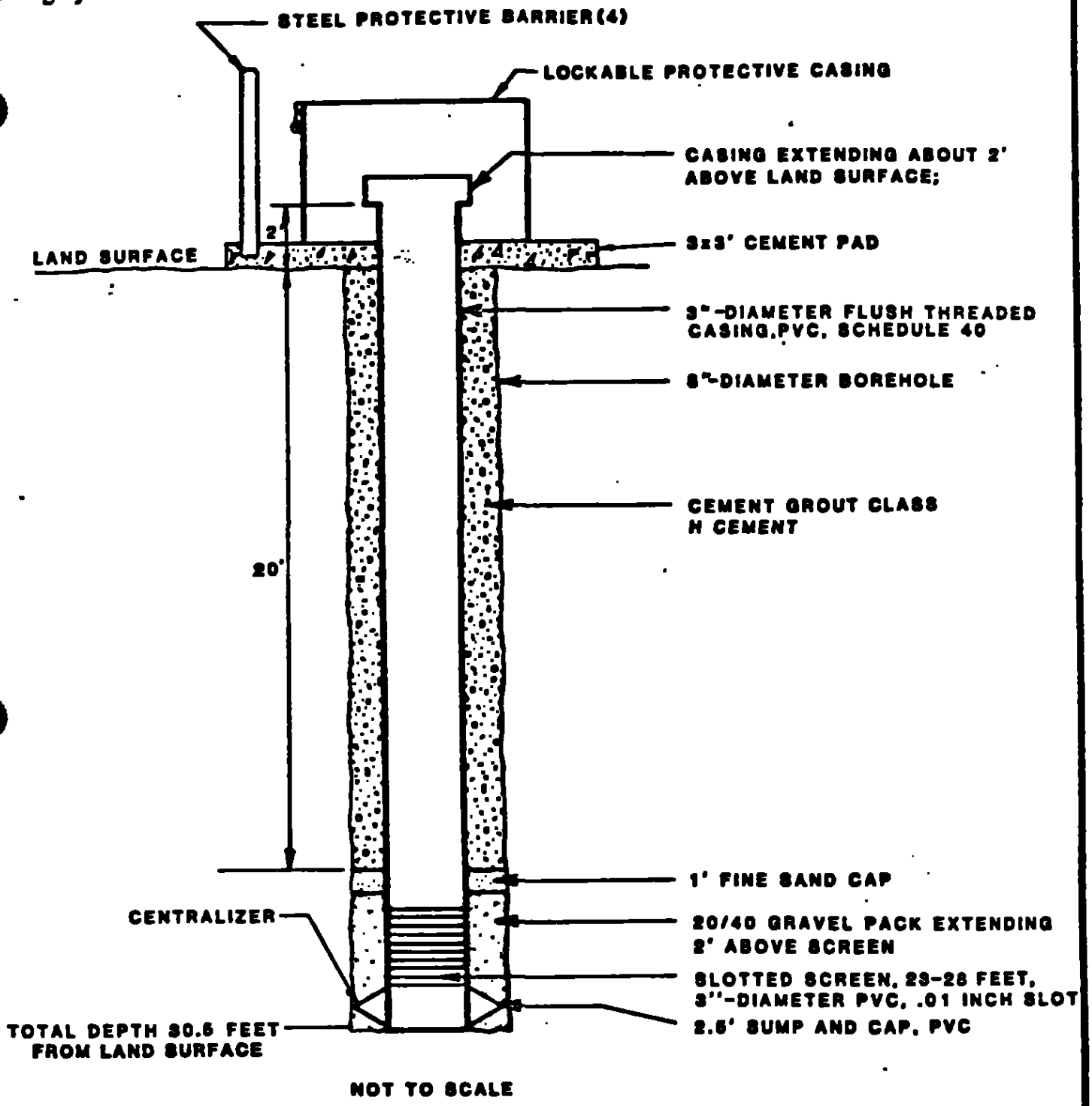


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FIGURE D-9.

CONSTRUCTION DIAGRAM OF MW-28

Geraghty & Miller, Inc.

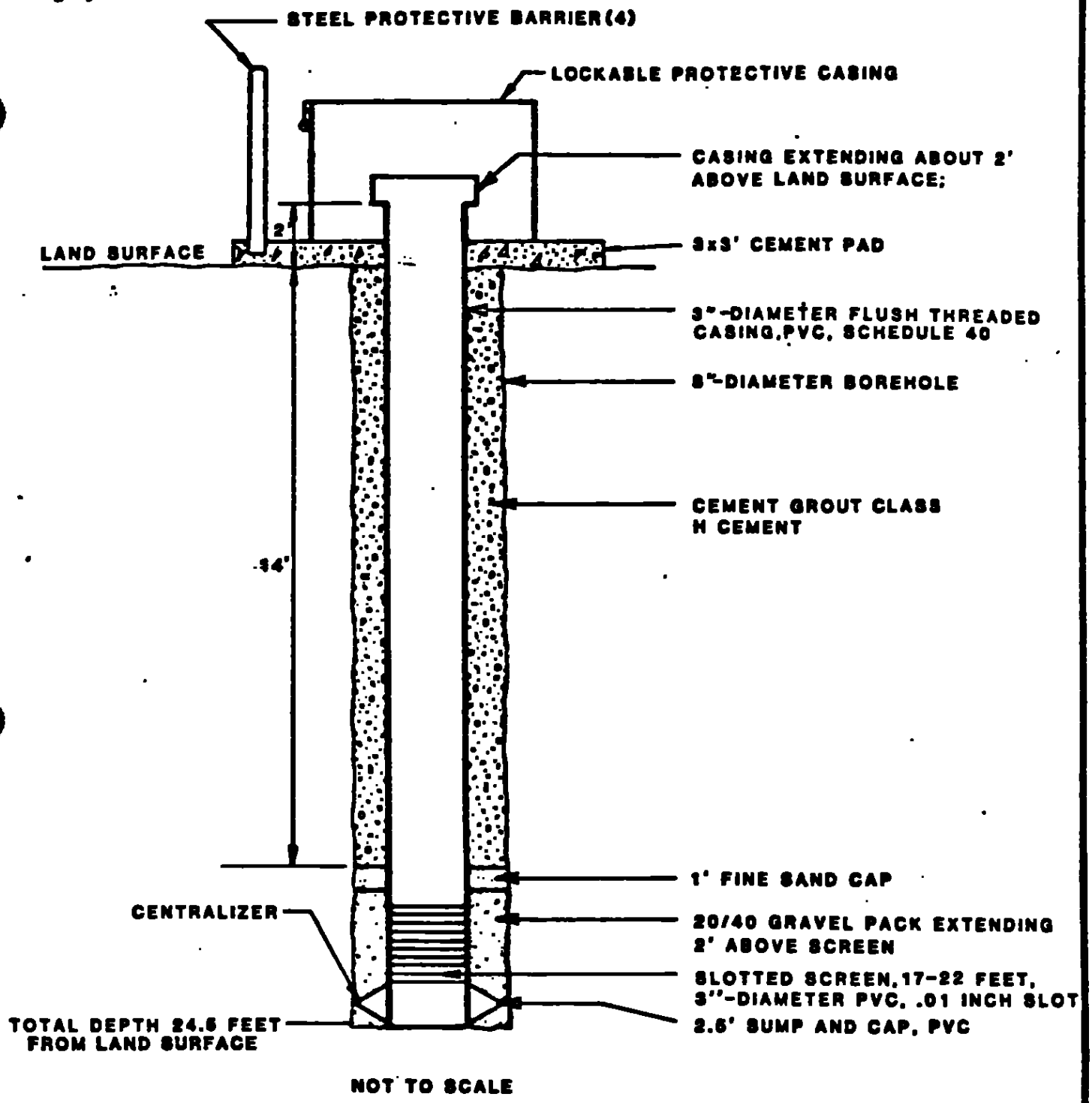

FIGURE D-10.

CONSTRUCTION DIAGRAM OF MW-29

Geraghty & Miller, Inc.

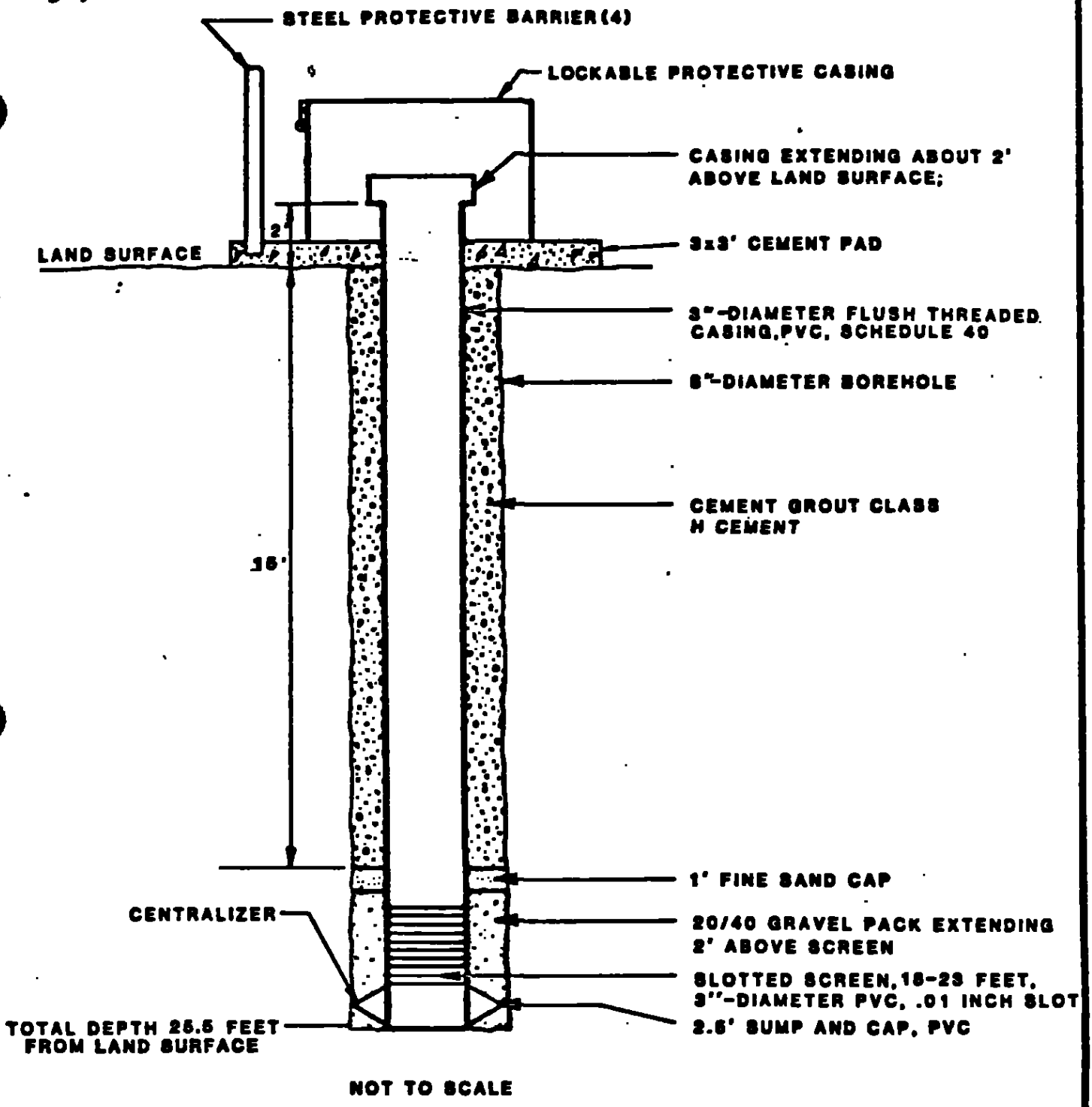

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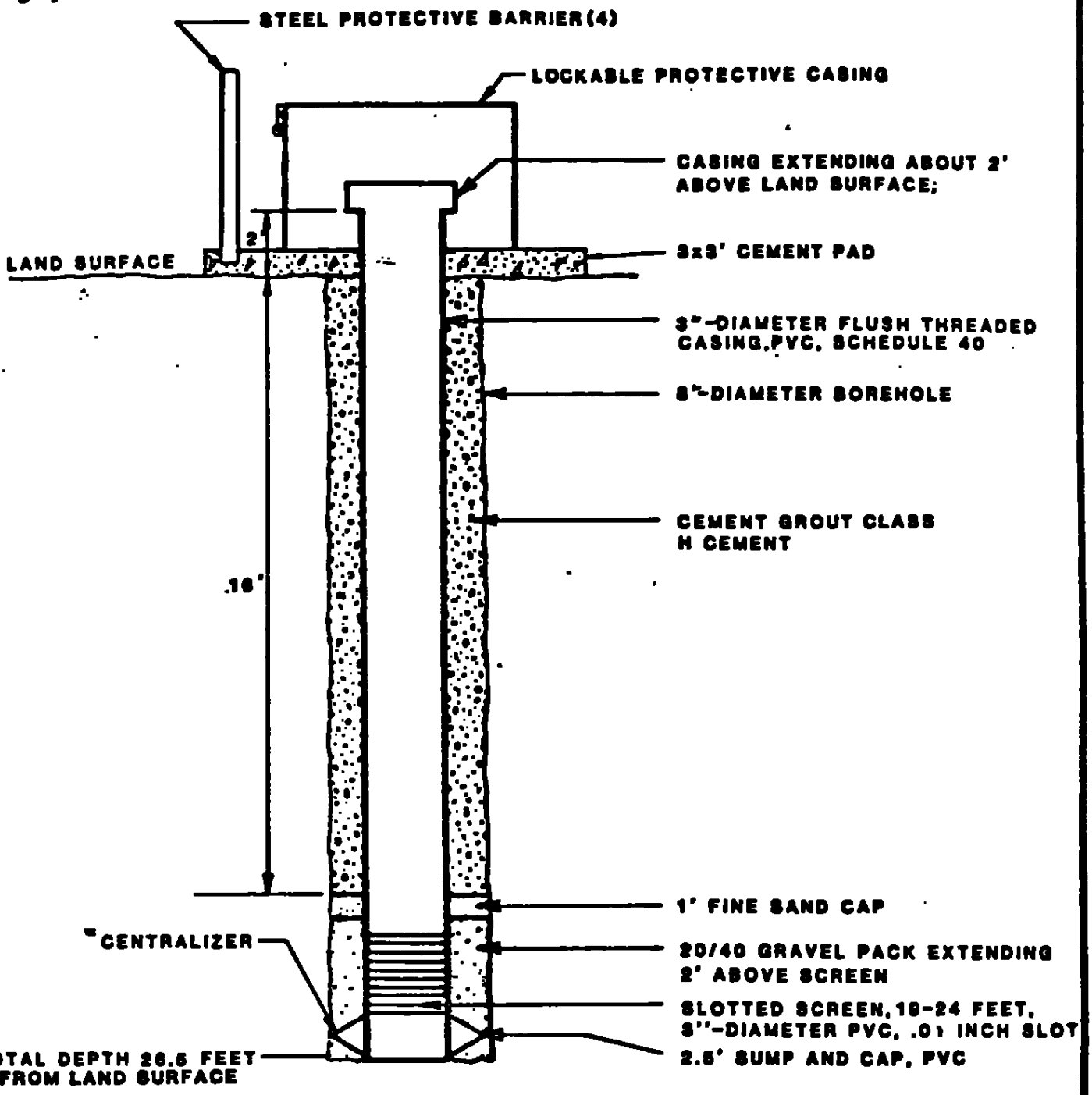
FIGURE D-11.

CONSTRUCTION DIAGRAM OF MW-30

Geraghty & Miller, Inc.



NOT TO SCALE

FIGURE D-12

CONSTRUCTION DIAGRAM OF MW-31

TABLE D-1

Monitor-Well Construction Information Details
American Cyanamid Company
Westwego, Louisiana

Monitor-Well Number	Nearest Boring Number	Depth Drilled Below Land Surface (ft)	Elevation of Measuring Point(1) (ft-msl)	Total Depth of Well from Measuring Point (ft)	Borehole Diameter (in)	Casing and Screen Diameter (in)	Screen Setting Below Landsurface (ft)	Screen Slot Size (in)
MW-4	MW-4	65	6.52(2)	62.00	6	3	52-62	.01
MW-7	MW-7	50	6.83(2)	45.70	6	3	36-46	.01
MW-11	MW-11	33	11.51(2)	33.00	6	3	23-33	.01
MW-12	MW-12	38	7.96(2)	38.00	6	3	28-38	.01
MW-14	MW-14	30	13.00	30.90	8	3	10-30	.01
MW-20	K-15	23	15.30	26.00	8	3	15-20	.01
MW-21	K-5	22	13.70	23.55	8	3	14-19	.01
MW-22	K-1	20	13.22	21.95	8	3	12-17	.01
MW-23	K-13	21	12.05	22.95	8	3	13-18	.01
MW-24	K-9	25	11.10	27.00	8	3	17-22	.01
MW-25	MW-5	31	9.41	32.85	8	3	23-28	.01
MW-26	MW-15	16	10.89	19.00	8	3	8-13	.01
MW-27	K-12	26	10.01	27.60	8	3	18-23	.01
MW-28	K-11	31	8.42	33.65	8	3	23-28	.01
MW-29	MW-16	25	10.22	26.50	8	3	17-22	.01
MW-30	K-10	26	9.60	27.85	8	3	18-23	.01
MW-31	K-23	27	14.55	29.00	8	3	19-24	.01

(1) Measuring point is from the "Well-Wizard" sampling stage except were noted.
(2) Measuring point is from top of well casing.

Rev. 04/87

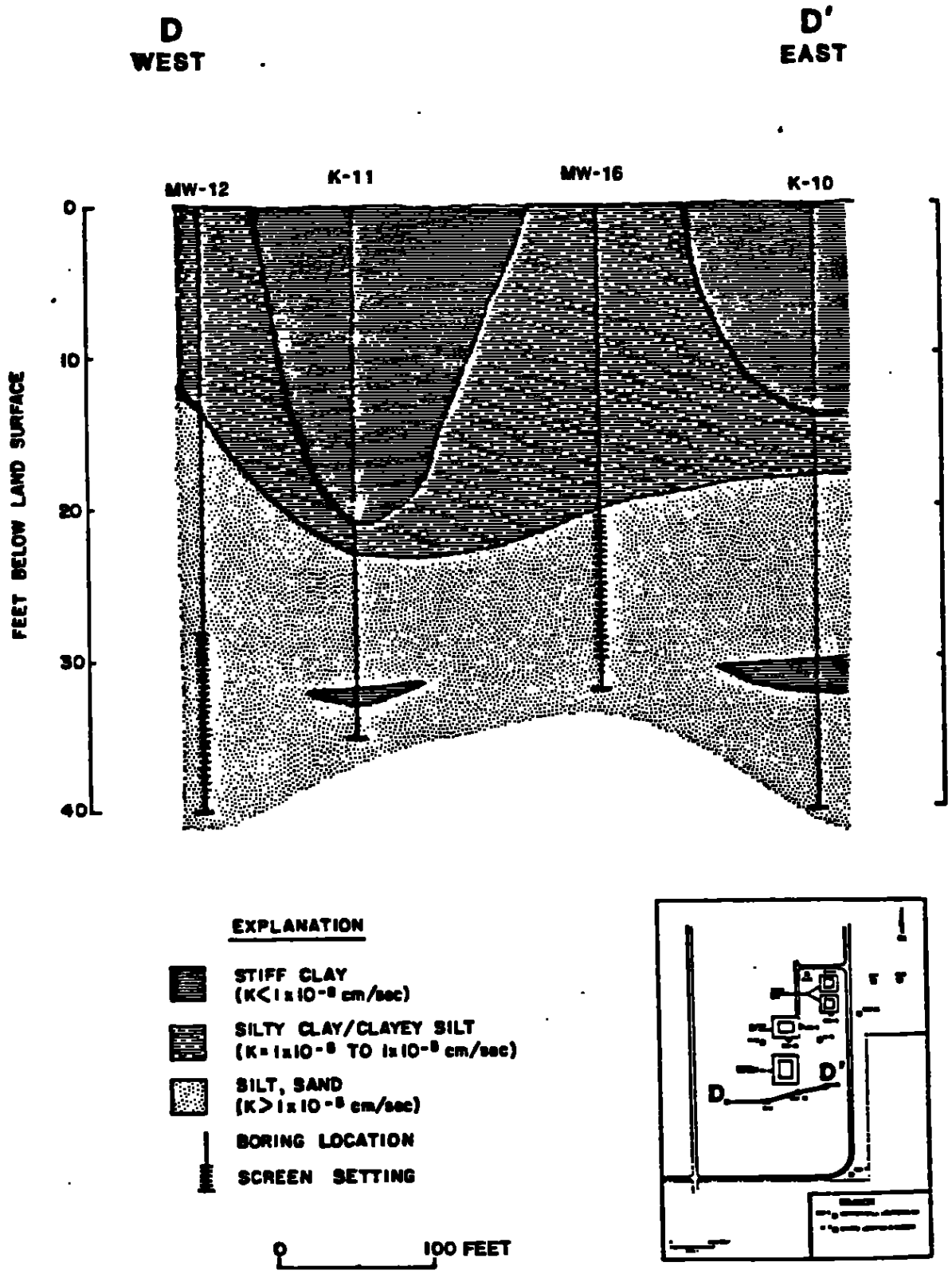


FIGURE 8. CROSS-SECTION MAP, D-D'.

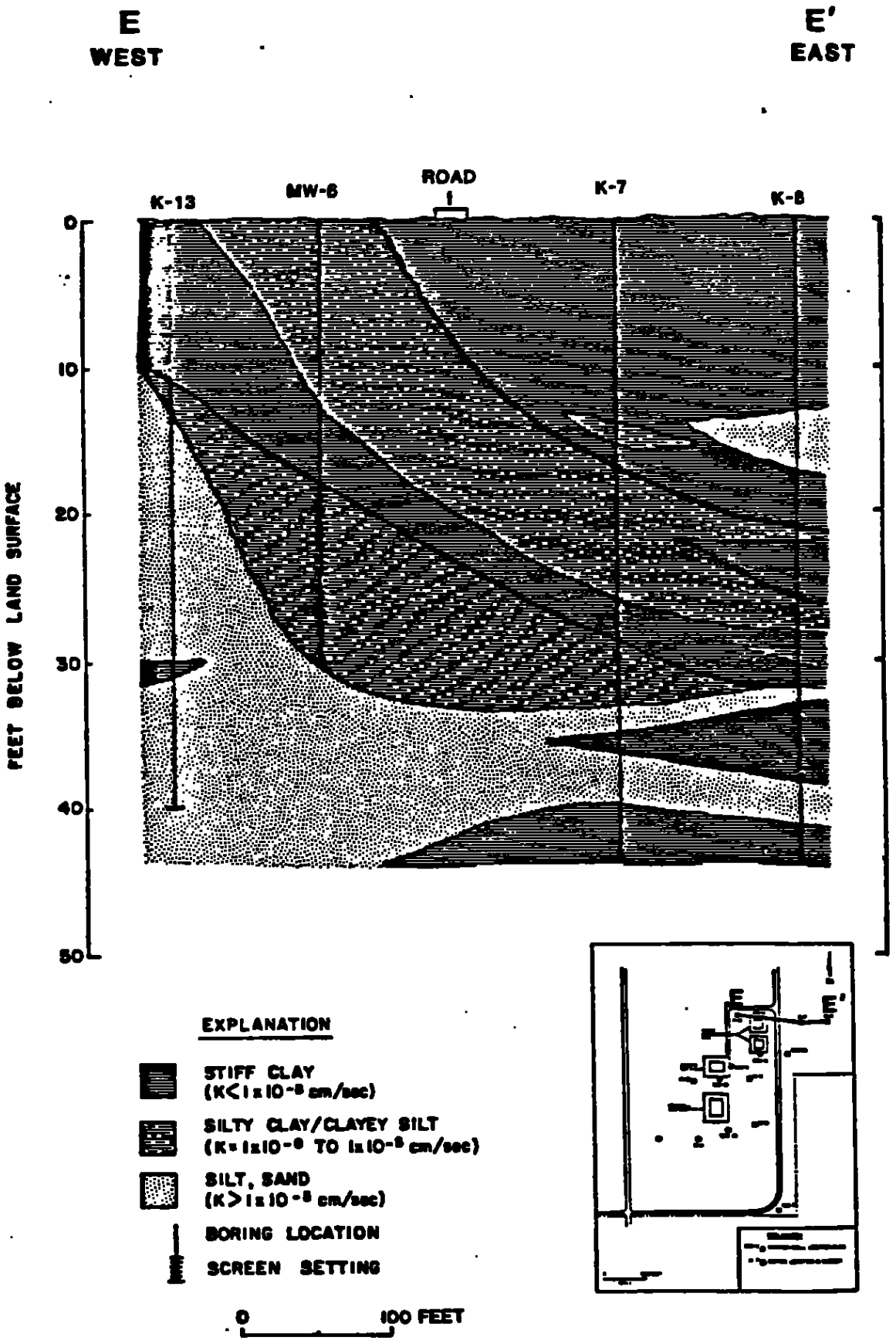


FIGURE 10. CROSS-SECTION MAP, E-E'.

Direction of Movement

Water-level measurements obtained from the monitor wells for several years consistently indicate that the potential horizontal flow direction in the surficial aquifer is generally south-southeasterly away from the Mississippi River, as shown in Figure 11. The horizontal hydraulic gradient within the aquifer is about 0.005 ft/ft. A reversal in ground-water flow, i.e. hydraulic gradient, has not become apparent during periods of low river stages. Therefore, the upgradient side is to the north-northwest of each HWMA and the downgradient side is to the south-southeast of each HWMA.

Rate of Movement

Using Darcy's Law, the potential rates of horizontal ground-water movement were estimated for the shallow aquifer. The ground-water migration velocities presented here are only intended to provide an estimate of the general order of magnitude and should not be used for detailed site specific assessments. The average horizontal ground-water velocity is a function of the hydraulic conductivity (K), the hydraulic gradient (i), and the effective porosity (p).

The horizontal ground-water flow velocity (V_h) is expressed as follows:

$$V_h = \frac{(K)\ (i)}{(p)}$$

where: K = Horizontal hydraulic conductivity (about 1 x 10^{-5} cm/sec in the silt zone)

i = Hydraulic gradient (about 0.005 ft/ft)

p = Effective porosity (0.2, assumed)

Assuming an effective porosity of 0.2, an average hydraulic conductivity of about 1 x 10^{-5} cm/sec, and a hydraulic gradient of 5 x 10^{-3} ft/ft, the pore water velocity of ground water moving laterally away from the river through the uppermost permeable zone is about 0.25 ft/yr. At this rate it would take water that enters the silt aquifer along the downgradient edge of a HWMA impoundment about 400 years to reach a monitor well located 100 feet downgradient. The actual rate of flow will vary from place to place because the hydraulic conductivity and gradient vary from place to place.

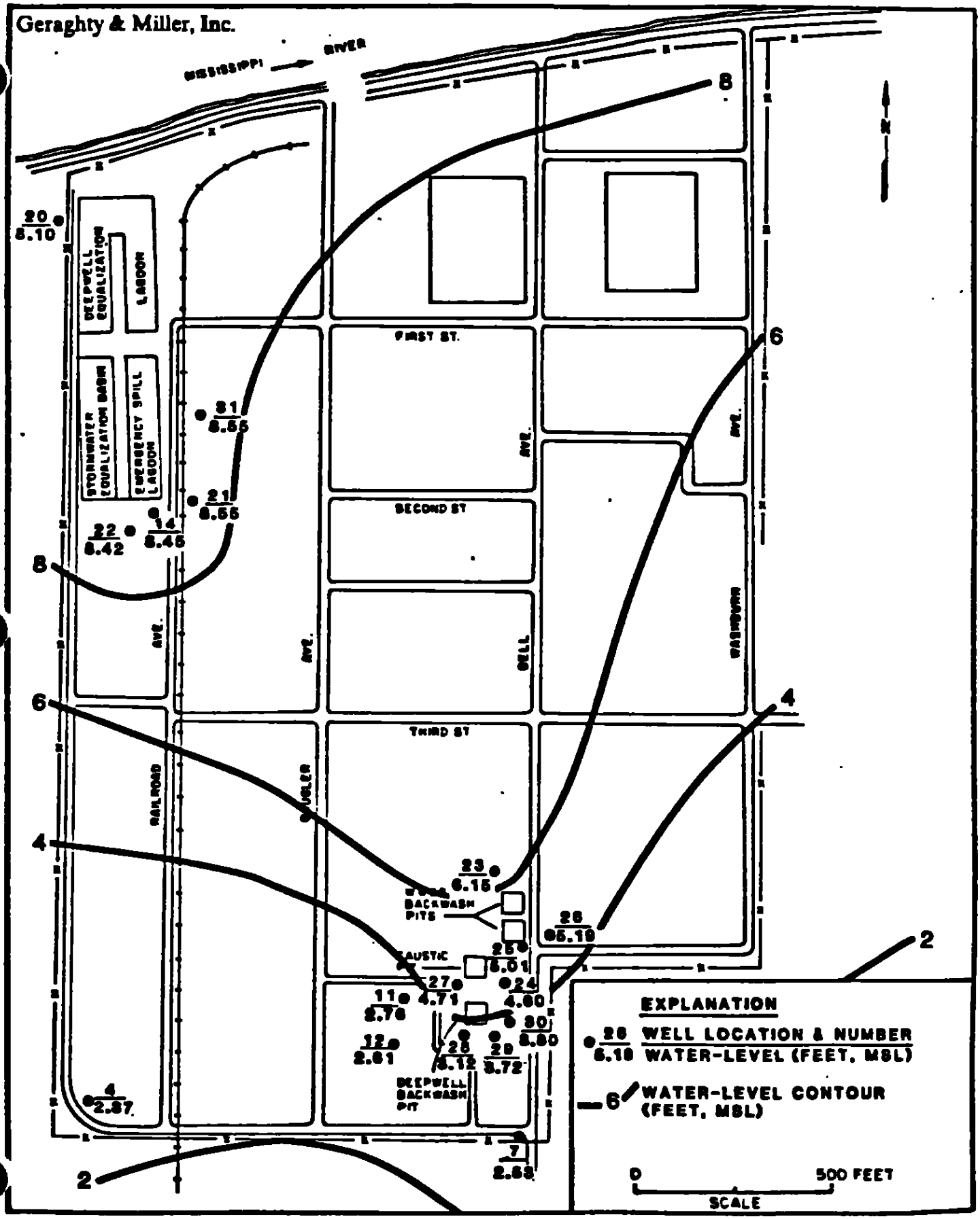


FIGURE 11. WATER-LEVEL CONTOUR MAP FOR NOVEMBER 25, 1985.

MONITORING NETWORK

As a result of the hydrogeologic assessment, G&M recommended installation of an additional twelve (12) monitor wells (MW-20 through MW-31). Subsequent to DEQ approval, these wells were installed and developed; four (4) were installed around the lagoon area (Figure 12) and eight (8) around the pit area (Figure 13).

G&M recommended that the wells be located where the surficial clay deposits were thinnest. Screen intervals were selected near the top shallow aquifer where the most mobile contaminants would be found and, as requested by the DEQ, five foot screens were installed in each of the monitor wells.

Justification for Monitor-Well Locations

Lagoon Area

Monitor wells were installed to monitor the lagoon area. Cross-section A-A' (Figure 6) indicates that the optimum depth and location for monitor well MW-20 is on the upgradient side of the lagoon near borings K-14 and K-15 (Figure 3). The screen interval (15 to 20 ft bls) was selected in the upper half of the 10-foot silt zone. The

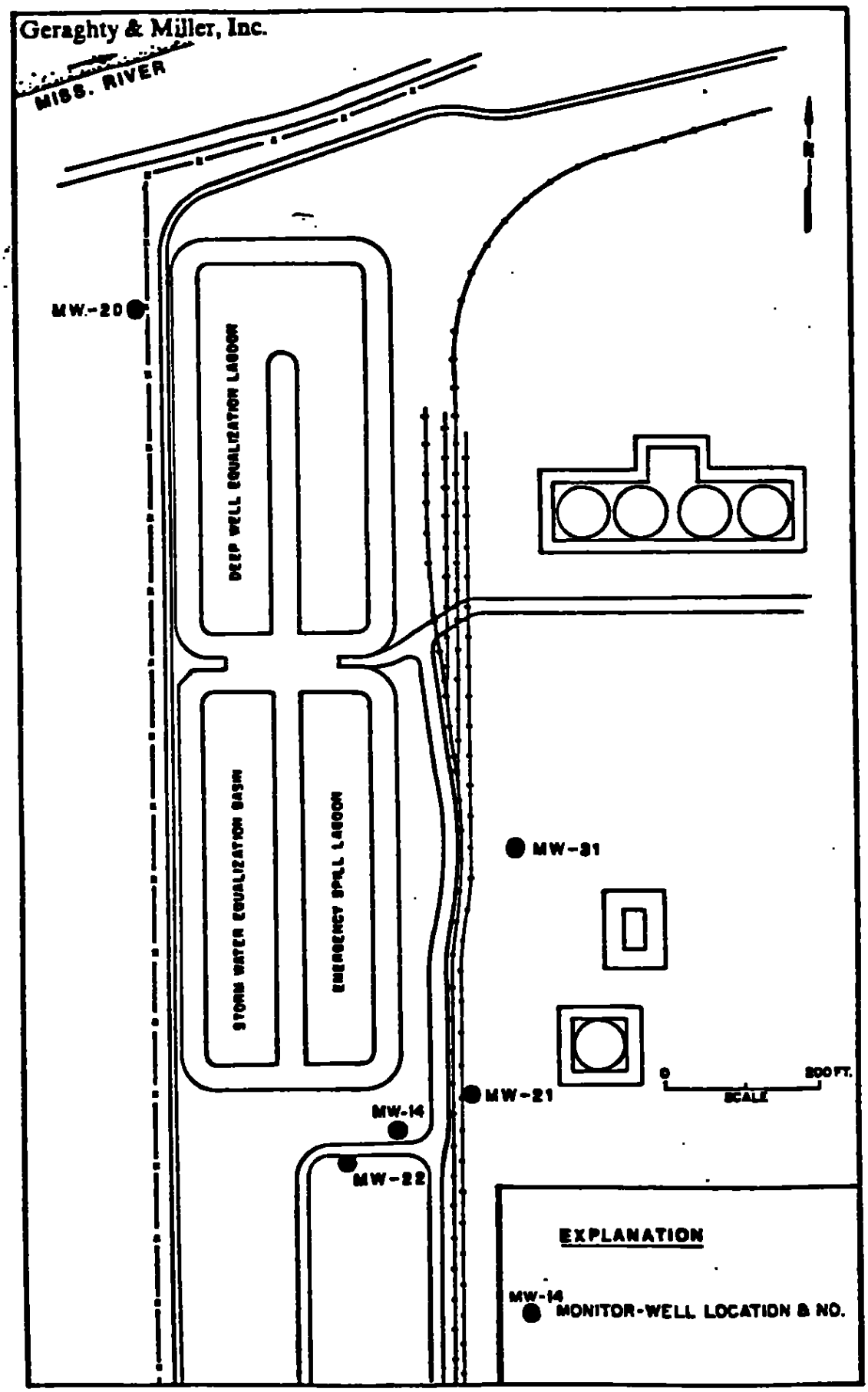


FIGURE 12 MONITOR-WELL LOCATION MAP - LAGOON AREA.

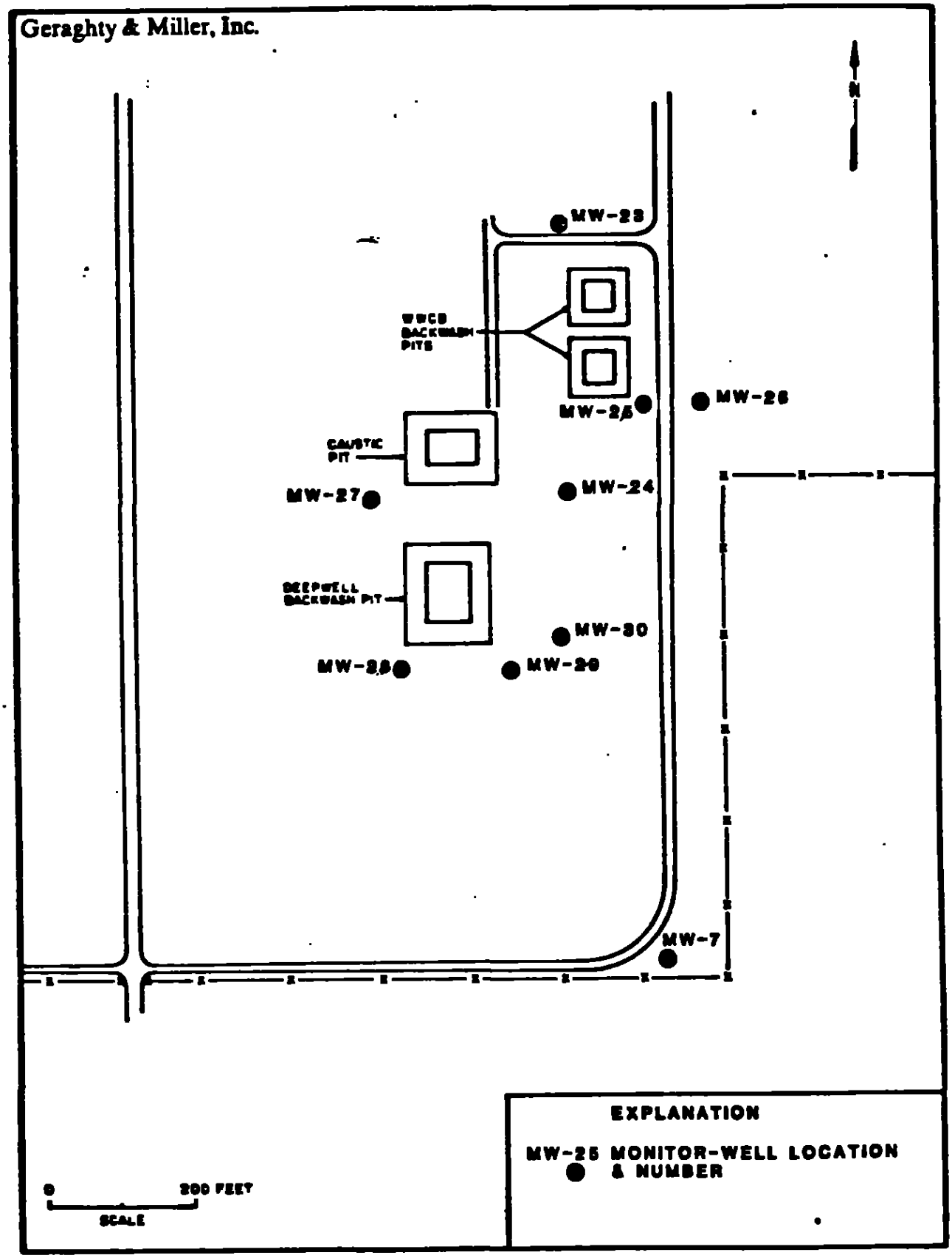


FIGURE 18 MONITOR-WELL LOCATION MAP - PIT AREA.

Corps of Engineers and the Jefferson Parish Levee Board gave their permission to install the borings and the monitor wells.

Three wells were installed on the downgradient side of the lagoon area. Well MW-31 was selected at boring location K-23 for the following reasons:

1. It is along the apparent potential flow path of ground water migrating south-southeast from the lagoon area;
2. It is located in an area that is presently free from abnormally high concentrations of common ions, such as calcium, magnesium, bicarbonate, and chloride. These ions were found in abandoned wells (MW-13 and MW-17) located on the east side of the lagoon (although the reason for the presence of these rather common ions is not known, it is certain they do not originate from the lagoon area);
3. A permeable silty sand zone was found (19-24 ft bls) at about the same depth as the screened intervals of monitor wells south of the lagoon.

Monitor wells MW-21 and MW-22 were installed about 100 feet east and west of well MW-14, respectively. These three wells monitor the ground-water downgradient of the lagoon HWMA and are screened in lithologically similar deposits ranging from 12 to 19 ft bls.

Pit Area

In the pit area, eight (8) monitor wells were installed and developed; wells MW-23 and MW-27 are upgradient, and

wells MW-24, MW-25, MW-26, MW-28, MW-29 and MW-30 are downgradient. All are screened in the upper silt, which appears to be laterally continuous in the HWMA pit area. A detailed discussion of the monitor-well installation program, the construction details, and individual monitor-well construction diagrams are provided in Appendix D.

CONCLUSIONS

In conclusion, the expansion of the ACC ground-water monitoring system recommended by G&M in April 1985, is now complete and is in compliance with all expressed Federal and State Interim Status ground-water monitoring regulations. The monitoring network was designed and constructed to provide representative ground-water samples from the uppermost portion of the Point Bar aquifer at locations capable of intercepting contaminants migrating from the impoundment areas.

CLOSING COMMENT

Geraghty & Miller, Inc., has enjoyed providing ground-water consulting services to ACC for this important project and thanks Mr. Jerry Johnson and Mrs. Anita Junker for providing information from their files in a timely manner and expediting the field operations.

Sincerely,

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